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METHODS OF TEACHING BRAILLE READING.

BY- LOWENFELD, BERTHOLD ABEL, GEORGIE LEE
FREDERIC BURK FOUNDATION FOR EDUCATION

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THIS THREE-PART REPORT DESCRIBES THE STATUS OF BRAILLE READING INSTRUCTION IN LOCAL AND RESIDENTIAL SCHOOLS IN THE UNITED STATES IN 1965, PRESENTS STATISTICS DESCRIBING PERSONAL CHARACTERISTICS OF 200 STUDENTS TESTED AS PART OF THIS STUDY, AND PRESENTS ANALYSIS AND INTERPRETATION OF THE DATA GATHERED FROM THE TESTS. THE STATUS OF BRAILLE READING INSTRUCTION WAS DETERMINED FROM QUESTIONNAIRES FILLED OUT BY 520 TEACHERS. NO CONSISTENTLY DIFFERENT PATTERNS OF INSTRUCTION WERE FOUND. IN THE SECOND PART OF THE STUDY. TESTS FOR DETERMINING READING RATE AND READING COMPREHENSION OF BRAILLE READERS WERE GIVEN TO 50 FOURTH GRADERS AND 50 EIGHTH GRADERS FROM LOCAL SCHOOLS AND AN EQUAL NUMBER FROM THE SAME GRADES IN RESIDENTIAL SCHOOLS. THE RESULTS WERE COMPARED WITH MEASURES OF THE SAME ABILITIES IN VISUAL READERS. RESULTS OF THE STUDY SHOWED THAT AGE DIFFERENCES BETWEEN BLIND AND SEEING CHILDREN, AS GRADE-LEVEL GROUPS, WERE FAR LESS THAN REPORTED IN THE PAST. FOURTH-GRADE BLIND CHILDREN WERE 1.2 YEARS OVER AGE, AND PRACTICALLY NO DIFFERENCE WAS FOUND FOR EIGHTH GRADERS. INTELLIGENCE LEVELS OF FOURTH-GRADE STUDENTS WERE CLOSE TO AVERAGE, AND EIGHTH GRADERS WERE ABOVE NORMAL. READING COMPREHENSION OF THE BLIND CHILDREN WAS EQUAL TO THAT OF THE SEEING CHILDREN IN THE FOURTH GRADE, BUT WAS SUPERIOR TO THE COMPREHENSION OF SEEING CHILDREN IN THE EIGHTH GRADE. MOST STUDENTS WITH HIGH COMPREHENSION WERE FAST READERS, AND THOSE WITH LOW COMPREHENSION WERE SLOW READERS. READING BEHAVIORS FOUND TO BE CHARACTERISTIC OF THE SLOW AND FAST READERS WERE DESCRIBED, AND RECOMMENDATIONS FOR READING INSTRUCTION WERE GIVEN. (AL)

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Berthold Lowenfeld, Ph.D.
Georgie Lee Abel, M.A.

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Frederic Burk Foundation for Education
San Francisco State College

San Francisco, California

CONTENTS

Page

Acknowledgements iv

Introduction 1

Historical Background 1
Review of Pertinent Literature. 2
Purposes of the Study 6

Chapter

I. THE STATUS OF BRAILLE READING INSTRUCTION IN 1965 9

Participation of Local and Residential Schools in Answering the Questionnaire 9
Summary of Answers and Comments in the Questionnaire 11
Conclusions 25
Summary 26

II. THE READING TESTS 28

The Sample 29
The Tests 30
Summary of Statistics Describing Personal Characteristics of the Students 32
Summary of Statistics Describing Reading Behavior of the Students . . . 39
Conclusions 48
Summary 49

III. ANALYSIS AND INTERPRETATION OF THE TEST DATA 51

Chronological Age 51
Intelligence Quotients. 54
Reading Comprehension 55
  STEP Reading Comprehension 55
  SAT Reading Comprehension. 58
Reading Rate. 59

Chapter Page

III. ANALYSIS AND INTERPRETATION OF THE TEST DATA (continued)

Comprehension and Reading Rate. 64
Intercorrelations of Comprehension, Reading Rate, and Chronological Age 66
Means of Reading Rate, STEP and SAT Scores for "High" and "Low" IQ Groups 67
IQ, Reading Rate and Comprehension of RLF and Non-RLF Students. 70
Reading Behavior of the Students and Comprehension Scores and Reading Rates 72
Conclusions 86
Summary 88

References 94

Appendixes A-K

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INTRODUCTION

Historical Background

The present Study is designed to bring up-to-date our knowledge about braille reading instruction and the status of braille reading in local and residential schools for the blind in the United States. This topic was last treated in 1928 when Kathryn E. Maxfield's book The Blind Child and His Reading (27) was published by the American Foundation for the Blind in New York. It deals with practices prevailing about forty years ago. Since then many fundamental changes have taken place in the education of blind children which are of direct pertinence to braille reading instruction. Among these changes are the following:

1. Forty years ago, and even twenty years ago, braille reading was taught by using in succession Grade 1 (in which each word is fully spelled out), Grade 1½ (moderately contracted and now obsolete), and ultimately Grade 2 (contracted and generally used in embossed literature). In following this sequence, the reading and writing of many words had to be learned, unlearned, and re-learned as reading and writing progressed from braille Grade 1 to Grade 1½, and finally to Grade 2. This practice has now generally been given up and braille Grade 2 is used from the beginning of reading instruction. This created different conditions, never explored in their relation to the total reading instruction program, to rate of braille reading, and to comprehension of braille reading.

2. In 1927, braille reading was mostly taught by the letter method. The braille beginner had to learn first the letters of the alphabet, either alphabetically or in a sequence which was considered by the teacher the easiest to learn. After that, he proceeded to words and then to sentences. Since then many teachers changed to the word or sentence method by which the braille beginner immediately learns to read either whole words or short phrases.

3. Changes in the teaching of reading to seeing children have occurred which must have affected the teaching of reading to blind children.

4. The advent of audio-media (radio, television, recordings, and specifically, Talking Books for the

blind) has influenced the position of braille as a reading medium for the blind.

5. Braille printing has undergone many technical changes, as a result of which braille books are now more easily available and less expensive. In addition, new "instant" duplication machines provide a way of supplying embossed materials in small quantities and on short notice.

6. A corps of volunteer braille transcribers, unmatched anywhere in the world, has developed local and national services to supply to blind students braille and recorded material which is not available in printed braille.

7. The blind school-age population has shown a great increase, particularly over the last decade. In 1952, 6,343 blind pupils were registered with the American Printing House for the Blind as consumers of educational brailled material; in 1964, their number increased to 17,928.

8. In 1927, there was only one place which specialized in the training of teachers for blind children. At the present, many colleges and universities offer teacher education programs in special education which include more or less complete sequences in the education of visually handicapped children.

Review of Pertinent Literature

Reading is a complex process with many ramifications. It is no less so if the reading organs are not the eyes but the fingers, as is the case with blind children and adults. Much that has been written about visual reading can be applied to tactual reading with no or slight modifications. However, there are some areas in which touch reading presents problems sui generis. Some of these areas are outside the scope of this Study and will, therefore, not be reviewed here. Among these areas are the following: problems of the braille code; legibility of braille characters; size and spacing of braille dots; word recognition and misperceptions.

Literature in the area of the blind dealing with the reading process as such, the teaching and learning processes, and with reading comprehension and reading rate, falls within the scope of this Study and will be shortly reviewed. More extensive bibliographies and reviews are provided by Lende (21) until 1953, by Lowenfeld (25) until 1962 and (26) until 1963, by Ashcroft and Harley (2) until 1966, and by Nolan and Morris (31) from 1953-64.

The first scientifically conceived and oriented study was published in German in 1917: Karl Bürklen's Das Tastlesen der Blindenpunktschrift (4), and translated into English by Frieda Kiefer Merry in 1932 under the title Touch Reading of the Blind (5). This experimental study delineated and examined many of the problems which became topics of later studies such as, readability of the various dot combinations, preferred and optimal finger- and hand-use, touch motions, finger pressure, and reading rate. Many German researchers continued to study braille reading and the teaching of it, as for instance, Horbach (18) and Mayntz (28).

As already mentioned, Maxfield (27) wrote the first comprehensive book on the teaching of braille reading. In many points she agreed with the findings of Bürklen but differed with him in the question of which hand-use is more effective in braille reading. Bürklen (5) stated that reading with both hands is best but the left hand alone reads better than the right hand. Maxfield (27, p.47) reported that American experiences have also shown that both-hand readers are superior, but that right-hand readers are more efficient than left-hand readers. She observed that many of the best readers read ahead with the left hand before finishing the preceding line with the right hand. She stressed the importance of relaxation and correct posture in reading and she made many recommendations such as: in reading, the fingertips should not be pressed down too heavily; children should be taught to read with both hands; excessive up-and-down motion of the fingertips should be discouraged; books should be held parallel with the edge of the table or at a narrow acute angle; and lip movement and inner speech should be discouraged. Maxfield (27, p.60-97) also recommended teaching by the word method and the use of phonetic methods of teaching reading because of the prevalence of speech defects which were found among blind children.

An early experimental study of the silent reading habits of blind children was conducted by Holland and Eatman (16). They made moving picture records of twenty-eight children who were divided into "good" and "poor" readers. The moving pictures revealed that between six and seven per cent of the total reading time is spent in making return sweeps, with good readers taking less time than poor readers. Good readers also make fewer regressive movements and so does the right hand compared with the left hand. The performance of poor readers is, in general, less uniform than that of good readers. The records did not show any conclusive evidence concerning hand or finger preferences of good and poor readers.

Holland (15) studied speed and pressure factors and found that in reading braille fast readers tend to use less pressure than slow readers, and that pressure varies within a given line, being less at the beginning than at the end with various fluctuations within the line. Fertsch (9) reported some results of an investigation in which she used filmed records to isolate, measure, and evaluate some of the factors involved in reading braille. She found that silent braille reading is considerably faster than oral reading; that the hands of good braille readers move independently of each other in making regressive movements, and that using both hands together to make regressive movements is characteristic of poor readers; that independence of the hands in making return sweeps appears to be a factor characteristic of good readers; and that reading habits become established by about the time a pupil has reached the third grade, and do not change noticeably with increase in reading experience. Fertsch (10) also examined the problem of hand-dominance in reading braille. As already mentioned, Bürklen (5) was in favor of using both hands but considered the left hand as the proper reading hand. On the other hand, Maxfield (27, p.47) stated: "It seems probable that, if a child cannot learn to read with both hands, he should be trained to use the right hand unless he is definitely left-handed." Villey (38, p.237) recognized the differences between the findings of various investigators and indicated the possibility that they may be due to different methods of instruction rather than to actual hand-dominance. Fertsch's (10, p.349) own findings ascribe the discrepancies to differences in performance of good and poor readers. Her experiments revealed that readers whose hands are equally effective in perceiving braille read faster, and that among them are fewer poor readers than among those who use either the right hand or the left hand dominantly. Those with the right hand dominant perform better than those with the left hand dominant. Good readers read a substantial amount of material with the hands functioning independently, of which the right hand reads about twice as much as the left hand. Poor readers keep right and left fingers close together, and therefore read very little material with the hands independently.

Lowenfeld (24) carried out in 1945 a research study on braille and Talking Book reading in which he reported, among other things, age-grade status of almost 500 third, fourth, sixth, and seventh grade students, and also data on the reading rates of students on these grade levels. Hooper (17) and Loomis (23) conducted studies in 1946 and 1948 respectively, which led them to the conclusion that braille reading should be taught to blind children by using braille Grade 2 from the beginning. As time went on, this became more widely accepted.

In 1961, a Conference on Research Needs in Braille was held in New York, sponsored by the American Foundation for the Blind, in which many technical problems of braille were dealt with. Ashcroft (1, p.23) reported on his investigation of types of errors in braille reading and stressed: "Reading for meaning requires reading material within the range of experience of children. It is, therefore, not enough to determine readability in terms of word forms and sentence length. Readability must be related to meaning as well."

A number of articles have been written discussing reading programs on the primary level. Among them those of Kenmore (20) and of Misbach (29) are noteworthy.

Jones (19) studied the statistical material which the American Printing House for the Blind collected in connection with the registration of blind children for the purpose of receiving material published or provided by it. His analysis showed, among other interesting facts, that there is a tendency in residential schools for the blind to have children read braille while local schools show a tendency to have children read print. These trends affect children who have enough vision to be able to read with their eyes. He reports that among children with a visual acuity of 20/200, 92 per cent read print in local schools and only 50 per cent did so in residential schools. Nolan (30) replicated Jones' study in 1963 and found that the percentage of print readers in residential schools had increased considerably between 1960 and 1963.

In his review of research on braille reading, Hanley (11, p.66) writes: "It is disappointing to note that only one book, Maxfield's, has been published and this is sadly out-dated (1928)." He also listed (11, p.69) as the first area for future research the problem of time allotments in testing: "Present standards for time allowances need immediate revision. New norms for the Braille-reading student should be built which take into consideration the Grade 2 rather than Grade 1½ Braille speed factors."

Most of the studies reported above are of limited value mainly because of three factors: (1) Insufficient numbers of experimental subjects; (2) use of a definition of blindness which includes children with a considerable amount of sight (up to and including 20/200 visual acuity) together with those who are totally blind. Most children on the optimal end of the visual acuity range covered by the definition of blindness can read print and frequently do read braille with their eyes rather than by touch. For any investigation dealing with braille reading, only subjects whose vision is not sufficient to read braille visually should be used; and (3) the studies were made when pupils did not use braille Grade 2 or learned to use it only in the upper grades.

Purposes of the Study

The Study has the following aims:

(1) A description of the present status of braille reading instruction in local school programs for blind children and in residential schools for the blind.

(2) The application of reading tests to blind students in local programs for blind children and in residential schools for the blind for the following purposes:

(a) To determine certain characteristics of the groups of students (50 each on the fourth grade and eighth grade levels in local schools and in residential schools), such as distribution of IQ's, cause of blindness, visual acuity, age at onset of blindness, etc.,

(b) to describe the reading behavior of the students,

(c) to determine rate of reading and reading comprehension and to compare these with norms for seeing readers,

(d) to determine any differences which may exist in reading achievement between blind students in local schools and those in residential schools, and

(e) to determine the essential characteristics of efficient braille readers and of inefficient braille readers, and what relationship there is, if any, between certain individual characteristics of blind children and their achievement in braille reading.

The description of the present status of braille reading (1) is based on questionnaires which were sent to all known local school programs and residential schools for blind children. The aims listed under (2) were pursued by a combined application of reading tests and a student description questionnaire in which the teachers were asked to report individually for each student certain personal characteristics and certain facets of his reading behavior. Explanations and descriptions of all details will be found in the respective parts of the Study.

The results of the Study, in a preliminary form, were the topic of a Workshop Conference in which experienced teachers of braille readers and supervisors participated.

The presentation of the Study will be in three parts:

Part I will describe the status of braille reading instruction in 1965.

Part II will deal with the statistics describing the personal characteristics of the 200 students involved in the testing part of the Study and give a summary describing the reading behavior of these students.

Part III will present the analysis and interpretation of the data resulting from the testing.

I.

THE STATUS OF BRAILLE READING INSTRUCTION IN 1965

Participation of Local and Residential Schools in Answering the Questionnaire

In order to ascertain the status of braille reading instruction in the United States at the time of the Study, questionnaires were sent out to all residential schools for the blind and to all known programs for blind children in elementary local schools. The Directory of Agencies Serving Blind Persons--1965 (7) was used as a source for residential schools. The Directory of Special School Programs for Visually Handicapped Children, Fall 1964 (8), made available by the Office of Education, Department of Health, Education, and Welfare, Washington, D.C., and the directory California Public School Programs for Visually Handicapped Children and Youth 1964-1965 (6) were used as sources for programs in local schools.

A total of 382 letters (Appendix A-1,2) with Questionnaires (Appendix B) were addressed to persons in charge of programs for visually handicapped children in local and residential schools. Since the Questionnaire dealt with braille reading instruction, it was not sent to those schools which conduct only a secondary school program. Many of the local and residential schools have more than one teacher concerned with braille reading instruction. Therefore, an adequate supply of questionnaires was sent to these schools. The following Summary of Participation Statistics gives the data on the return of the Questionnaires.

Summary of Participation Statistics

Letters:		
Mailed	382	
Received	337	(88%)
Local Schools		
Letters mailed	332	
Letters received	287	(86%)
Letters indicating no programs conducted	29	
Letters received with filled-out Questionnaires	258	

Summary of Participation Statistics (Continued)

Residential Schools:		
Letters mailed	50	
Letters received with filled-out Questionnaires	50	(100%)
Questionnaires received:		
From residential schools	73	
Teachers represented	130	
From local schools	289	
Teachers represented	390	
Total questionnaires received	362	
Total teachers represented	520	

Of the 382 letters mailed, 337 (88 per cent) replies were received. Questionnaires were sent to 50 residential schools, which constitute all regular residential schools for blind children in the United States; all 50 (100 per cent) responded. Of the 332 letters mailed to local schools educating blind children in the United States, there were responses from 287 (86 per cent). Of these, 29 letters indicated that the respondents conducted at present no programs in which blind children were instructed. Among those not answering the Questionnaires, must undoubtedly have been some who did not reply because in the year of the Study they had no blind children enrolled. This may in part explain why a smaller percentage of local schools replied than the 100 per cent reply received from residential schools. Thus, 258 local schools filled out and returned Questionnaires.

The 50 residential schools supplied 73 Questionnaires made out by different teachers or supervisors. Some of the questionnaires indicated that the replies represented answers by more than one teacher. If all teachers participating in the Questionnaire replies are counted, 130 teachers concerned with braille reading instruction in residential schools for the blind responded.

Of the 289 Questionnaires received from local school teachers or supervisors, some were answered by more than one teacher. If all teachers responding are counted, a total of 390 teachers in local schools conducting programs for blind children participated in the Study.

Therefore, a total of 362 Questionnaires filled out by 520 teachers constitute the source from which conclusions on the present status of braille reading instruction are derived.

Many teachers added, on their own, comments to the factual answers checked in the Questionnaires and also commented in the space where they were requested to do so. Of the 73 Questionnaires from residential schools, 60 (82 per cent) included such comments and of the 289 Questionnaires from local schools, 240 (83 per cent) did so. This high degree of spontaneous reaction indicates the active interest with which teachers and supervisors in both types of programs responded to the Questionnaire.

Summary of Answers and Comments in the Questionnaire

Following is a resume of the answers for each question of the Questionnaire as they were received from local and residential schools. This is followed by a brief interpretation which also reflects the discussions of the Braille Reading Workshop held at San Francisco State College, and by a summary of the comments which were made by the teachers in the Questionnaires.

Question 1: When is braille reading begun?

Local Schools:
a. Kindergarten: 49
b. 1st grade, first semester: 219
second semester: 12
c. 2nd grade: 2
Kindergarten and 1st grade: 7

Residential Schools:
a. Kindergarten: 22
b. 1st grade, first semester: 48
second semester: 1
c. 2nd grade: 0
1st and 2nd grade: 1
Kindergarten and 1st grade: 1

The replies show that the majority of local and residential schools began braille reading instruction in the first semester of the first grade. However, almost one-third of the residential school Questionnaires indicate that braille reading instruction was already begun in the kindergarten. In local schools, only one-sixth followed this practice. The explanation for this difference lies most likely in the facts that relatively more residential schools conducted kindergartens than local schools, and also that local school kindergarten teachers were usually not familiar with braille while those in residential schools were. In addition, most educators of young children believe that reading instruction should not be started at an age level below the first grade.

Comments (75 local school teachers; 18 residential school teachers): Most of the comments stressed the importance of readiness for the beginning of reading instruction and reported that such readiness programs are carried on at the kindergarten level. They also stressed that readiness is an individual characteristic and that the beginning of braille reading instruction must be determined by the needs of each individual child. Some teachers in local schools reported that their beginning blind first graders follow generally the pattern for sighted beginning readers. One reply, however, said: "We believe emphatically that no child should be subjected to a reading program until he is at least seven years of age." One teacher commented: "I find the booklet 'Touch and Tell' (3 volumes) very helpful. Also for beginners I do a lot of tracing with fingers of various forms made from sand paper, felt, etc. Also a 'Guess What' box containing everything is good for training the sense of touch." Another teacher: "I encourage Twin Vision books for home reading to pre-schoolers by parents." A teacher who checked that braille reading is begun in the first grade, first semester commented: "However, there have been children who were not able to start at this time--hence, we waited, and when they began, they progressed so well that even with a tardy start they finished the year reading on grade level." A few local school teachers reported that their reading instruction is done to coincide with the reading done by the sighted children. A number of teachers also reported that they use different methods with those students who need to learn braille after they have already learned to read printed material. One teacher reported: "In these cases I start teaching them to read and write braille immediately." Others reported that they are using a variety of approaches with these children.

Question 2: How do you begin teaching braille reading?

Local Schools:
a. With the braille alphabet: 49
b. With whole words: 96
c. With meaningful sentences: 46
With the braille alphabet and with whole words: 31
With whole words and with meaningful sentences: 43
With braille alphabet, with whole words, and with meaningful sentences: 24

Residential Schools:
a. With the braille alphabet: 16
b. With whole words: 34
c. With meaningful sentences: 2
With the braille alphabet and with whole words: 7
With whole words and with meaningful sentences: 11
With braille alphabet, with whole words, and with meaningful sentences: 3

It must be assumed that all those who indicated that teaching braille reading is begun with the braille alphabet are essentially users of the letter method, even if they added "with whole words" or "with meaningful sentences." These replies were combined and compared with those mentioning only whole words and/or meaningful sentences. The replies showed with striking similarity, that in local schools as well as in residential schools, 64 per cent begin with whole words and/or meaningful sentences, and only 36 per cent begin by using the braille alphabet. This constitutes a remarkable change, since not too long ago the letter method was more widely used on the assumption that touch reading is necessarily letter-by-letter reading. (27, p. 89,90)

Comments (60 local school teachers; 7 residential school teachers): Readiness and consideration of the individual child were stressed in comments of many teachers. Those in local schools mentioned frequently that "teaching a child to read and write braille is like teaching a sighted child to read and write," and that they follow closely what the regular classroom teacher is doing in her reading instruction. Many teachers who checked that they begin with the braille alphabet, stressed that they form "family words" on a phonic basis as soon as the children have learned the needed letters. The phonic method was mentioned frequently by those who begin teaching reading with the braille alphabet. Those who teach by using words and sentences stressed that they must be meaningful to the child. One teacher observed that it is most important "to make sure that the child realizes one reads to get meaning from books or stories." The use of flashcards was mentioned by some. One residential school reported that they use pegs and pegboards and another that they use plain cubes in a slate, stressing the "sense of position" of the braille dots.

Question 3: What Grade of braille do you use in beginning reading?

Local Schools:
a. Braille Grade 1 (full spelling): 7
b. Braille Grade 1½ (slightly contracted braille): 4
c. Braille Grade 2 (fully contracted braille: 273
    Braille Grade 1 and Braille Grade 1½: 2
    Braille Grade 1 and Braille Grade 2: 3

Residential Schools
a. Braille Grade 1: 1
b. Braille Grade 1½: 1
c. Braille Grade 2: 70
    Braille Grade 1 and Braille Grade 2: 1

Ninety-six per cent of the residential schools and 94 per cent of the local schools answered that they are using braille Grade 2. Only four local schools and one residential school schecked Grade 1½. When the Questionnaires were sent out, it was expected that some rather important "pockets" of braille Grade 1½ usage would turn up. The fact is that they are not in existence and that braille Grade 2 is generally taught from the beginning. This also constitutes a basic change, since even in the early 1940's Grade 1½ was almost universally popular and the American Printing House for the Blind supplied its primers in Grade 1 or Grade 1½. Following the lead of those educators who began teaching braille Grade 2, the American Printing House for the Blind started publishing primers in Grade 2 and thus promoted the use of fully contracted braille to the extent that braille Grade 2 is now universally taught from the beginning.

Comments (7 local school teachers; 2 residential school teachers): In three questionnaires, teachers reported that they teach contractions giving at the same time their full spelling. One mentioned that they use at first meaningful words that do not have any braille contractions, and another that fully contracted braille is used but without marks of punctuation. One teacher reported that she encourages the use of the fingers for complete sentence span as soon as possible. One comment dealt with pupils who are transferred to braille classes after the second grade and reported that they start these pupils with the braille alphabet.

Question 4: If you do not begin with braille Grade 2, when do you introduce it?

Local Schools:
a. First grade: 2
b. Second grade: 5
Second grade and third grade: 1
When ready: 1

Residential Schools: No answers

Since practically all Questionnaires reported the use of braille Grade 2, few answers only were received to this question. These indicated that the few local school teachers who use braille Grade 1½ begin to teach braille Grade 2 mostly on the second grade level.

Question 5: With which hand do you encourage children to read?

Local Schools:
a. With the right hand: 26
b. With the left hand: 2
c. With both hands: 250
Either: 11

Residential Schools:
a. With the right hand: 10
b. With the left hand: 1
c. With both hands: 62

Most local school Questionnaires (87 per cent) and residential school Questionnaires (85 per cent) indicated that they encourage the use of both hands in braille reading. However, 14 per cent of the residential school teachers and 9 per cent of those in local schools encourage the use of the right hand. There are some local school Questionnaires which indicated that the teachers let the children use either hand, apparently according to the individual child's preference.

Comments (43 local schools; 5 residential schools): Comments concentrated upon two issues. (1) Though the use of both hands is encouraged, many of the pupils as they grow older and read independently, use only one hand--the one that is satisfactory to them. One teacher went so far as to state: "The child will devise methods that prove successful to him regardless of the method taught." (2) Though the children are encouraged to read in certain ways, they vary in techniques individually. A number of teachers also stressed that they encourage the use of the right hand as the reading hand with the left hand functioning as a guide. One teacher described her procedure thus: "I actually encourage the children to use both hands when reading, using the left hand to keep their place, reading halfway across the page with both hands and then bringing back the left hand to the beginning of the next line by finishing with the right hand." The use of both hands was also advocated so that the student may later on be able to read with the left hand and keep the right hand free for note-taking, or vice versa if the pupil is left-handed.

Question 6: Does right- or left-handedness receive consideration in your program?

Local Schools:
Yes: 146
No: 124
No left-handed children had: 19

Residential Schools:
Yes: 39
No: 30
No left-handed children had: 4

It is interesting that in both facilities about half of the Questionnaires indicated that they do give consideration to left-handedness while the other half do not, or have never had any left-handed children to teach braille.

Comments (149 local schools; 35 residential schools): This question evoked the largest number of comments; about half of the teachers responding felt that they wanted to explain their checked answers. Most comments of the local school teachers stressed that "children are allowed to use whichever hand they prefer for reading, just as seeing children, but must use the other hand to keep place." The comments of the residential school teachers almost uniformly reported that they allow the child to use his left hand if he is actually left-handed. One teacher reported: "I have noticed that the dominant hand tends to take over the reading. So after encouraging the use of both hands, I watch to see which one predominates." A few teachers commented that the left-handed child actually reads better with his right hand and uses his left hand to locate the beginning of the next line. One reply stated: "It appears that the best braille reading hand is opposite from their dominant hand," while another one stated: "Usually the predominant hand is more sensitive." Some local school teachers reported that in using slate and stylus, the left-handed child is definitely encouraged to use the hand of his dominance for the stylus operation. One teacher stressed a practical point of view in defending her procedure of using both hands as reading hands--the fact that one hand may become injured and if it is the only reading hand, it becomes impossible to read. Another teacher reported that they have found "that the book position changes slightly with the child's left- or right handedness." A few teachers also commented that they consider left- and right-handedness in other areas but reading, such as in the use of pencil, crayons, scissors, etc. One teacher reported that she has observed tenseness in left-handed pupils. Many teachers in both facilities commented that consideration of left-handedness is important because lack of it may lead to maladjustment, in the same way as it does with seeing children.

Question 7: Circle the finger (or fingers) which you encourage children to use in reading.

Local Schools: (The fingers which were encircled are given)
1-1: 104
21-12: 39
321-123: 31
4321-1234: 29
-1: 12

2-2: 7
Various other combinations: 22
As child prefers: 45
"As they prefer" added to encircled fingers: 41

Residential Schools:
1-1: 49
21-12: 5
321-123: 4
4321-1234: 3
1-123: 2
Various other combinations: 6
As child prefers: 4
"As they prefer" added to encircled fingers: 7

The replies to the question of which fingers are encouraged in the use of braille reading showed the only real difference between local schools and residential schools. The index fingers of the left and the right hand (1-1) were given by 67 per cent of the residential school Questionnaires but only by 36 per cent of the local school Questionnaires. Conversely, only one-third of the residential school replies and almost two-thirds of the local school replies reported that they encourage the use of other fingers or combinations of them. The use of two, three, or four fingers on each hand was reported by 99 (34 per cent) of the local schools, while only 12 (16 per cent) reported this for the residential schools. Thus it appears that local school teachers tend to encourage to a larger extent the use of two or more fingers on both hands in the reading process. Also, local school teachers appear to be more permissive in letting children use the preferred fingers since 16 per cent of them reported that they leave it to the children to use fingers as they prefer while only 5 per cent of the residential school teachers did so. Similarly a greater percentage of local than of residential school teachers added "as they prefer" to the encircled finger(s), the use of which they encourage.

Comments (47 local schools; 12 residential schools): Many of the local school teachers stressed that "most of the good readers soon develop their own style of reading, not only in the use of their hands but in the choice of fingers." They believe that no matter what is encouraged for the beginner, "in later years they use the fingers they are most comfortable in using." One questionnaire suggested that "there is some switching that occurs naturally in case of injury to the favored finger." One residential school commented: "The kindergarten and first grade teachers encourage the children to read with the first fingers of the right and left hands. The second grade teachers (and teachers of grades beyond second) encourage children to read with all fingers of both hands." Another residential school reply reported: "We encourage use of six fingers, but feel this can be overstressed. Many children develop one dominant finger, with other fingers picking up additional information, such as punctuation, or checking and keeping the place on the page. It is not uncommon for the best readers in older groups to use only one finger."

In defense of the use of other but the index fingers, it was mentioned that the latter are more inclined to be callused and, therefore, less sensitive. One comment said that the use of the index fingers is prevalent by beginning readers and encourages attention and concentration. The use of flashcards also tends to encourage the use of the index fingers only. On the other hand, the whole word or sentence approach induces the use of more fingers. In favor of the use of all four fingers of both hands, it was mentioned that this promotes a physical attitude of relaxation. It was also said that some fingers may only trail the line and not actually be used in reading.

Question 8: Who provides initial instruction in braille reading, and how many are employed at your school in each category listed:

Local Schools (Numbers in parentheses indicate total numbers employed in the respective local schools):

a. The resource teacher: 159 (198)
b. The itinerant teacher: 69 (113)
c. The classroom teacher of visually handicapped children: 28 (34)
d. The regular classroom teacher: 2
e. A special braille teacher: 22 (34)
The resource and itinerant teacher: 6
The resource, itinerant and special braille teacher: 3

Residential Schools:
a. The classroom teacher: 117
b. A special braille instructor: 13

Of the 390 teachers in local schools who are represented in the Questionnaire, 198 (51 per cent) are resource teachers, 113 (29 per cent) itinerant teachers, and 34 (9 per cent) each are classroom teachers of visually handicapped children and special braille teachers.

Of the 130 teachers in residential schools who answered the Questionnaires, 117 (90 per cent) are classroom teachers and 13 (10 per cent) special braille instructors. This shows that only few residential schools employ special braille instructors while most of them consider the teaching of braille reading a part of the classroom teacher's responsibility. This permits the teacher to deal with braille reading as an integral part of her classroom instruction, a condition which can also be achieved with a special braille instructor but only under the most favorable cooperative arrangements between the special braille instructor and the regular classroom teacher. It is interesting to note that the percentage of special braille teachers is about the same in local schools as in residential schools.

Question 9: When do you introduce braille writing?

Local Schools:
a. At the same time as reading: 105
b. After some reading skill has been developed: 63
c. Second grade: 1
e. According to the child's individual level of ability: 50
After some reading skill has been developed according to the child's individual level of ability: 41
At the same time as reading, according to the child's individual level of ability: 28
Kindergarten (before reading): 1

Residential Schools:
a. At the same time as reading: 26
b. After some reading skill has been developed: 17
e. According to the child's individual level of ability: 16

After some reading skill has been developed according to the child's individual level of ability: 7

At the same time as reading, according to the child's individual level of ability: 6

No answer: 1

Replies which indicated either a (at the same time as reading) or b (after some reading skill has been developed) and added to these checked answers "according to the child's individual level of ability" were combined with a and b respectively. The replies to this question are almost exactly the same in local and in residential schools. In local schools, 46 per cent indicated that they introduce braille writing at the same time as reading and in residential schools, 44 per cent. Thirty-six per cent and 34 per cent respectively reported that they do so after some reading skill has been developed. About 40 per cent of the replies in both facilities considered the child's individual level of ability as an important factor in determining when to introduce braille writing.

Comments (29 local schools; 5 residential schools): One local school teacher commented that she found children being slowed down in their reading if writing is taught together with reading. Another commented: "This is an individual decision. If it is a curious, mechanically-minded boy, I would start reading and writing simultaneously. A delicate girl might not have the strength or interest for a brailler until she can read quite well." A teacher of a residential school commented: "I find it much more satisfactory to have the youngsters well into beginning reading before starting the writing--otherwise they tend to be too analytical, trying to figure out words letter by letter." Another one: "We use rhythm writing, similar to that done in typing. This increases the speed of some and makes careless writers more careful." A different viewpoint was expressed by this teacher: "I have discovered that children find braille writing much easier than braille reading. Learning to write their reading vocabulary enhances their progress in reading." One teacher commented: "With some slow children I even introduce braille writing first." Some teachers wanted to make children familiar with the mechanical part of the braillewriter at an early stage so that they can begin braille writing whenever the child is ready for it, and some found that "operating the braillewriter is fascinating for some youngsters" and that "children feel a sense of accomplishment in putting something down."

Question 10: What do you use to teach beginning writing?

Local Schools:
a. Slate and stylus: 4
b. Braillewriter: 283
    Slate and stylus and braillewriter: 2

Residential Schools:
a. Slate and stylus: 2
b. Braillewriter: 68
    Pegs and pegboards: 2
    Slate and stylus and braillewriter: 1

Almost uniformly the braillewriter was checked as being used to teach beginning writing. Only four local and two residential school Questionnaires indicated that they use slate and stylus. There are two residential Questionnaires in which information was volunteered that pegs and pegboards are used. The prevailing use of the braillewriter also constitutes a decisive change as compared with the past when slate and stylus were widely used in the teaching of writing. This is certainly the case, because braillewriters were then neither as perfected nor as available as they are now.

Comments (23 local schools; 5 residential schools): Most of the comments stressed that the use of the braillewriter is easier for immature muscles and "most easily complements early reading skills." It also "permits early integration into a regular classroom for most of the day." A local school teacher reported: "I have found that the visually handicapped student can do his work on the Perkins Brailler as fast as his fellow sighted students. This has been a great factor in the success of the public school youngsters in our school system." A few teachers reported that they introduce the slate and stylus on the fifth, sixth, or junior high school level to make it easier for the students to take notes, because slate and stylus are easily portable. Another teacher made the suggestion that "if a child uses a slate and stylus, it might be well to emphasize reading with one hand so that the other hand will be free to copy assignments."

Some additional information about reading instruction was secured from the local and residential schools who participated in the administration of the reading tests to their students. These answers were received on the form entitled Reading Instruction Information (Appendix J) of which 41 came from local schools (LS) and 20 from residential schools (RS). The following questions were asked and answers received:

1. Name of reading series presently used:

	LS	RS
Ginn Basic Readers	19	7
New Basic Readers (Curriculum Foundation Series), Scott	16	16
Reading for Meaning Series, Houghton	3	
Sheldon Basic Readers, Allyn	3	
Adventures in Reading (California State Series), Winston	3	
Bett's Basic Readers, American Book		3
Various	14	8

2. What supplementary materials, such as workbooks, are used:

	LS	RS
Workbooks	21	15
Teacher-made materials	7	4

3. When are reading books, including pre-primers, introduced:

	LS	RS
At the beginning of braille reading instruction	16	2
After words or sentences are read	19	18
Individually	3	

In local schools, reading books were introduced in almost equal numbers at the beginning of braille reading instruction and after the children have learned to read words and sentences. In residential schools, the former was done only rarely while the latter was practiced by a large majority. The difference between local and residential schools in this respect may be due to the fact that teachers in local schools were inclined to follow the practices used with seeing children in the regular classrooms, while teachers in residential schools preferred to wait until the children were able to read words or sentences before they introduced reading books.

4. Is your reading instruction primarily conducted by:

	LS	RS
Oral reading	1	1
Silent reading	2	
Both	36	19

Local as well as residential schools conducted reading instruction almost exclusively by oral as well as silent reading.

5. Is double-spaced material used in beginning reading instruction:

	LS	RS
Yes	35	20
No	2	

Double-spaced material was generally used in local as well as residential schools at the beginning of reading instruction. This was certainly due to the fact that the American Printing House for the Blind follows this practice in most of its printed early reading material.

6. Is enlarged cell material used in beginning reading instruction:

	LS	RS
Yes	3	3
No	35	17

Enlarged cell material, as produced by pegboards, marbles, and domino-type arrangements (27, p.88, 196) and in material published by the American Printing House for the Blind embossed in "very much enlarged braille," "much enlarged braille," "moderately enlarged braille," and "slightly enlarged braille," has been used rather widely in the past. Our information indicates that it was only rarely used and that the large majority of local as well as residential schools began reading instruction by using standard size braille. Enlarged braille encourages the dot-by-dot perception of each braille letter or sign. Standard size braille can be covered in one act by the cup of the reading finger(s) and, therefore, encourages simultaneous per-

perception of each letter. Also, enlarged braille material encourages up-and-down motion of the reading finger(s) while standard size braille is conducive to horizontal movement of the reading finger(s) without up-and-down motions.

7. Check which tests you are using routinely at your school or class:

	LS	RS
Hayes-Binet Intelligence Test	25	12
Wechsler Intelligence Scales	23	18
Stanford Achievement Tests	30	19

Local schools report in addition the use of the Iowa Tests of Basic Skills (3), the California Achievement Tests (3), and eight various other tests.

From these reports it can be seen that local schools slightly favored the use of the Hayes-Binet Intelligence Test while residential schools reported a wider use of the Wechsler Intelligence Scales. According to Hayes (14, p.148) the Interim Hayes-Binet IQ's and the Wechsler IQ's have a very high correlation (tetrachoric $r = .94$) and can be used alternatively. The administration of the Wechsler Intelligence Scales takes considerably less time than that of the Interim Hayes-Binet. Since residential schools must test a considerable number of blind students and local schools usually have only a few to test, the difference in time, favoring the Wechsler Scales, may account for their wider use in residential schools.

Conclusions

The survey on the status of braille reading instruction in 1965 revealed a considerable uniformity of methods. There are only two areas where substantial differences existed: (1) One-third of the teachers began braille reading instruction with the braille alphabet while two-thirds used the word or sentence method. However, many of those who began with the alphabet indicated that they shift to the word method as soon as the children have learned enough letters to permit this.

(2) There was no uniformity in the use of fingers which teachers encouraged in braille reading instruction.

These two differences did not indicate that there were two different methods of instruction in use. The survey also showed that local schools and residential schools did not differ essentially in their braille reading instruction.

Summary

The survey on the current status of braille reading instruction which is derived from replies of 289 teachers of blind children in local schools and 73 teachers in residential schools revealed the following facts:

Most local and residential schools for the blind began their braille reading instruction in the first grade, after pre-reading activities had been pursued during the kindergarten year. About one-third of the schools started the reading instruction by teaching the braille alphabet, while two-thirds began with whole words and/or meaningful sentences. Practically all schools used braille Grade 2 (fully contracted braille) from the beginning.

So far as hand-use is concerned, about 85 per cent of the teachers encouraged their children to use both hands; the remaining teachers encouraged right-hand use. Comments of the teachers indicated that they recognize that pupils as they grow older devise their own way of reading regardless of methods taught. More than half of the teachers gave consideration to left-handed pupils.

So far as finger-use is concerned, two-thirds of the teachers in residential schools encouraged the use of the index fingers of both hands. Various other combinations of finger-uses were encouraged only by two to six teachers each. In local schools, only about one-third of the teachers encouraged the use of the index fingers of both hands while the rest encouraged the use of various other combinations of fingers. Sixteen per cent of local school teachers and five per cent of residential school teachers reported that they leave it to the children to use fingers as they prefer.

So far as braille writing is concerned, almost half of the teachers in both types of schools introduced it at the same time as reading, and about one-third reported that they do so after some reading skill has been developed. Forty per cent of the replies reported that they consider the child's individual level of ability. The braillewriter was almost universally used to teach beginning writing.

Initial instruction in braille reading was given in local schools by resource teachers (51 per cent), by itinerant teachers (29 per cent), by classroom teachers (9 per cent), and by special braille teachers (9 per cent). In residential schools, this was done by classroom teachers (90 per cent) and by special braille teachers (10 per cent).

Some additional information was secured from the smaller sample of teachers whose students took part in the tests which were given in connection with the Study (20 from residential and 41 from local schools). In local schools, reading books, including pre-primers, were introduced either at the beginning of braille reading instruction or after words or sentences were read, while residential schools by a large majority introduced them only after words or sentences were read. Reading instruction was conducted by oral as well as by silent reading. Double-spaced material appeared to be universally used in beginning reading instruction. The use of enlarged cell material has almost disappeared and standard size braille, which encourages horizontal movement of the reading finger(s) without up-and-down motion, was almost generally used.

Local schools used in equal numbers the Hayes-Binet Intelligence Tests and the Wechsler Intelligence Tests, while more residential schools used the Wechsler Intelligence Tests. The Stanford Achievement Tests were the most widely used tests of their kind.

II.

THE READING TESTS

The first part of the Study, describing the status of braille reading instruction in 1965, did not reveal any consistently different patterns of instruction which would indicate the use of two or more different entities of instructional procedure. For this reason, the planned comparison between different instructional procedures and their results could not be made. Therefore, the second part of the Study deals with the determination of reading rate and reading comprehension of braille readers; the comparison of these data with those found for visual readers; and the comparison of results derived from groups of blind children attending local schools with those attending residential schools. The Study was also designed to give data on certain individual characteristics of the children taking part in it, such as, cause of blindness, age at onset of blindness, amount of visual residue, etc. In a special reading information sheet, a number of questions were asked dealing with the reading behavior of each child participating in the Study. These individual reading behavior items and the results achieved in terms of reading rate and reading comprehension were then correlated in order to determine whether efficient and inefficient braille readers showed different characteristics and if so, what they were.

To achieve the above-given aims, a geographically balanced group of local schools and residential schools for blind children were asked how many fourth and eighth grade students they would be willing to supply as participants for the Study (Appendix C and D). These students had to meet certain conditions which will be described later. Early in October 1965 the material for testing and description of the students was sent to the schools with a request to have completed data returned by the middle of December (Appendix E-K). Since the schools were hit by the effects of a rather severe influenza epidemic during the winter of 1965-66, many of them did not return the data until March 1966. A further difficulty was caused by the fact that not enough fourth grade children could be located in local schools to give us the necessary number of participants. This entailed rather extensive correspondence before the required number of suitable students was located.

The collection of the raw data took some time and the necessary computer work met with some time delay. Finally, at the end of June 1966, the data were available and could be submitted and discussed at a Workshop on Braille Reading Instruction which was conducted at San Francisco State College from July 5 through 9. The following persons, who were experienced braille teachers or supervisors, took part in this conference and made many and valuable contributions for which the authors of the Study are indebted to them: Miss Myrna Campbell, Resource Teacher, Parma, Ohio; Mrs. Marion H. Grew, Coordinator of Program for Visually Handicapped, Tacoma, Washington; Mrs. Estelle Hagood, Elementary Instructional Supervisor, Texas School for the Blind; Miss Freda Henderson, Teacher, Tennessee School for the Blind; Mrs. Jerrine M. Lucas, Resource Teacher, San Leandro, California; Mrs. Marguerite McCaffrey, Resource Teacher, Temple City, California; Mrs. Sally Fox Mangold, Resource Teacher, Castro Valley, California; Miss Althea H. Nichols, Supervisor of Instruction, New Jersey Commission for the Blind; Mrs. Sara C. Schell, Resource Teacher, Atlanta, Georgia; Miss Claire Schirmer, Resource Teacher, Chicago, Illinois; Miss Toshi Tekawa, Teacher, California School for the Blind; Mr. Dean Tuttle, Resource Teacher, Carmichael, California; and Sister Mary Uriel, Itinerant Teacher for the Visually Handicapped, Diocese of Brooklyn, Brooklyn, New York.

The Sample

A total of 200 blind students made up the population of the Study. One hundred of these students were fourth graders, fifty of them attending local schools with programs for blind children and fifty attending residential schools for blind children. The other one hundred were eighth graders, also equally divided between local and residential schools. Of the 200 students, 106 were boys and 94 were girls. In our request for selection of participants (Appendix C and D), it was stipulated that only students who had a visual acuity of 5/200 or less should be included and that they must also have no marked additional handicap. The following residential schools participated in the Study: Arizona School for the Blind, Arkansas School for the Blind, California School for the Blind, Florida Schools for the Deaf and Blind, Georgia Academy for the Blind, Illinois Braille and Sight Saving School, Iowa Braille and Sight Saving School, Kansas School for the

Blind, Kentucky School for the Blind, Lavelle School for the Blind, Maryland School for the Blind, Missouri School for the Blind, Nebraska School for the Blind, New York State School for the Blind, Ohio State School for the Blind, Oregon State School for the Blind, Perkins School for the Blind, Texas School for the Blind, Utah Schools for the Deaf and Blind, and Western Pennsylvania School for Blind Children.

The following local school facilities took part in the Study: Tucson, Arizona; Azusa, California; Berkeley, California; Carmichael, California; Garden Grove, California; Long Beach, California; San Francisco, California; San Jose, California; Temple City, California; Denver, Colorado; Atlanta, Georgia; Chicago, Illinois (public and parochial); Gary, Indiana; Hyattsville, Maryland; Battle Creek, Michigan; New Jersey Commission for the Blind; New York, New New York; Cleveland, Ohio; Columbus, Ohio; Parma, Ohio; Toledo, Ohio; Pittsburgh, Pennsylvania; Houston, Texas; Seattle, Washington; and Tacoma, Washington.

The Tests

Among the many tests which are available for reading comprehension, two were selected to be used in the Study: the Sequential Tests of Educational Progress (STEP), Reading Part only; and the Stanford Achievement Tests (SAT), Reading Comprehension only.

The STEP Form 4B (Reading) designed for Grades 4, 5, and 6 was used for the fourth grade students and the STEP Form 3B, designed for Grades 7, 8, and 9 was used for the eighth grade students. The STEP reading test is described in the Manual for Interpreting Scores (34, p.7) as follows: "Measures ability to understand direct statements, to interpret and summarize passages, to see motives of authors, to observe organization of ideas, and to criticize passages with respect to ideas and purposes of presentation. Passages were selected to represent the major types of material which students are called upon to read: directions and announcements, articles of information or explanation, letters, stories, poetry, articles of opinion or interpretation, and plays."

Of the Stanford Achievement Tests (SAT), Paragraph Meaning Part only, the Intermediate I Battery of Form X for Grade 4 to the middle of Grade 5 was used for the fourth graders and the Advanced Battery, Form X for Grades 7, 8, and 9 was used for testing the eighth grade students. The Directions for Administering (36, p.4) describe the Paragraph Meaning test as follows: "... The test provides a functional measure of the pupil's ability to comprehend connected discourse involving levels of comprehension varying from extremely simple recognition to the making of inferences from what is stated in several related sentences. Special effort has been made to devise paragraphs interesting to pupils, and to make certain that the level of vocabulary is such that the test does not become one of word knowledge rather than of comprehension of connected discourse. The authors have attempted to emphasize the notion of 'reading as reasoning' and, accordingly, have constructed exercises that place a premium on genuine comprehension of the material read.

"The areas covered by the paragraphs include a broad category of miscellaneous items from general reading material, life science, physical science, geography, history, literature, other social sciences, and the fine arts. ..."

A letter and reply postcard (Appendix C and D) were sent to a number of schools, local and residential, requesting their further cooperation in the Study and asking them to report to us the number of children in the fourth and eighth grades who conformed with our requirements for the sample. The subsequent letter (Appendix E) sent to them gave the number of students on the fourth and eighth grade levels whom we requested as actual participants in the Study. It also included further details about giving the tests and recording its results. An Instruction Sheet for Student Description (Appendix F) and a Student Description form (Appendix G) was attached together with Directions for the Rate of Reading Test (Appendix H) and an IBM card (Appendix I) on which the student description was to be recorded. A Reading Instruction Information Sheet (Appendix J) included some questions about reading instruction, reading material and tests used by the schools. The final item was a Checklist of Material to be Returned (Appendix K) which was designed to facilitate and to ensure the return of all material needed for the Study.

As a result of these requests, the following material was received for 200 students who conformed with our requirements for the sample: (1) Answer sheets on which the results of the STEP Reading Test with the Reading Rate information were recorded, (2) answer sheets on which the results of the SAT (Paragraph Meaning) were recorded, (3) the IBM cards on which the Student Description was recorded, and (4) the completed Reading Instruction Information sheet. These items constitute the basic material for the statistical and factual interpretation of the Study.

Summary of Statistics Describing Personal Characteristics of the Students

The Student Description which was recorded on IBM cards contained twenty-four items. Of these, items 1 through 10 and item 24 dealt with personal characteristics of the student and the remaining items (11-23) concerned various aspects of the student's reading behavior. The IBM card also provided space for the name of the student, his birthdate, and the name and location of the school.

Item 1 checked whether the student was in the fourth or eighth grade. Item 24 checked whether the student attended a local school or a residential school.

The following presentation and discussion of items 2 to 10 will give a detailed description of the personal characteristics of the 200 students included in the Study.

(Item 2) The student's IQ falls within the range of:

	4th Grade				8th Grade			
	LS		RS		LS		RS	
IQ	f	%	f	%	f	%	f	%
120 plus	9	18	3	6	24	48	11	22
110-119	7	14	8	16	8	16	16	32
100-109	7	14	10	20	11	22	13	26
90-99	15	30	16	32	3	6	8	16
80-89	3	6	9	18	2	4	2	4
70-79	9	18	4	8	2	4	0	0

This distribution shows that the middle range of IQ's (90-109) included 44 and 52 per cent of the students in fourth grades and 28 and 42 per cent of the students in the eighth grades of local and residential schools. The fourth and particularly the eighth grade students in local schools have greater percentages in the upper IQ range (110 and up) and smaller percentages in the lower IQ range (70-89). Fourth grade students in residential schools have almost equal numbers in the above and below middle IQ ranges, but on the eighth grade level they also have far more in the upper IQ range.

One might first think that teachers in local schools may have selected for the tests students who are more capable. This, however, cannot be the case because in the fourth grades of local schools the pupils participating in the Study constitute, in fact, the total blind student population in the participating schools. This is also the case in almost all local schools for the eighth grade students. Therefore, selection of more capable students by the local school teachers cannot play any role. In some residential schools, there were more students in the fourth and eighth grades than were needed for the Study to provide a geographically balanced selection. Therefore, some of the schools were asked to test fewer students than the total available. In order to safeguard a random selection, we asked these schools to take the requested number of students according to the alphabetical order of their names. All residential schools did this with the exception of one large school which informed us that, by chance, the first alphabetically listed students were all in the very low intelligence and achievement ranges. We requested the psychologist of this school to make a random selection of students whose intelligence and achievement were within the normal range. As the tests which were later submitted showed, this was done completely impartially for the six students tested.

In general, the data show that on the fourth grade level the number of students in the lower IQ range is fairly well-balanced by those in the upper IQ range. On the eighth grade level, however, students in the lower IQ range are far outnumbered by those in the higher IQ range. An explanation for this may be found in the fact that in local as well as in residential schools, older students whose IQ's are low may be placed in ungraded classes rather than in the eighth grade. This may be more common with blind than with seeing students in local schools. In a study, Hayes (14, p.151) reported "a very regular increase in mean IQ ... from the kindergarten to the post-graduate group which reflect the selective process as children pass upward through the school, as well as their intellectual development." These increases closely resemble the increases which this Study found in the IQ distribution, and as will be later shown in IQ means, of fourth graders as compared with eighth graders.

As an explanation for the larger number of high IQ students in the local schools as compared with residential schools (48 against 38), it could be assumed that the more capable blind students tend to be referred to local schools, while the less capable ones are more often placed in residential schools. The latter may perhaps be done in the hope that less capable students will develop better in an environment which is completely geared to the needs of blind children, and in competititon with other blind children rather than with those who can see. The data of the Study as such, however, give only the facts but no explanation for them.

(Items 3, 4) Indicate the student's over-all grade level achievement based on the latest achievement test scores:

	4th Grade		8th Grade	
	LS	RS	LS	RS
Grade Level Achievement	f	f	f	f
Over 3.0 years above	0	0	4	0
2.0 - 3.0 years above	3	0	8	9
1.5 - 1.9 years above	1	3	5	2
1.0 - 1.4 years above	4	2	3	6
0.5 - 0.9 years above	7	6	5	4
0.4 years below to 0.4 years above	5	15	10	6
0.5 - 0.9 years below	5	4	2	5
1.0 - 1.4 years below	6	3	1	0
1.5 - 1.9 years below	5	1	1	2
2.0 - 3.0 years below	2	0	1	1
Over 3.0 years below	0	1	1	0
Omits	12	15	9	15

The last line "Omits" shows that for about 25 per cent of the 200 students, no grade level achievements were reported. From this it can be inferred that some local and residential schools do not use achievement tests. Since there is such a large percentage of omissions, the frequencies given for this item are of doubtful value. In general, the pattern conforms with that of the IQ distribution.

(Item 5) The student first was enrolled at your school:

Grade of Enrollment	4th Grade LS f	4th Grade LS %	4th Grade RS f	4th Grade RS %	8th Grade LS f	8th Grade LS %	8th Grade RS f	8th Grade RS %
Kindergarten	16	32	29	58	14	28	28	56
1st grade	21	42	8	16	10	20	11	22
2nd grade	4	8	6	12	2	4	1	2
3rd grade	6	12	4	8	3	6	0	0
4th - 5th grade	2	4	3	6	4	8	3	6
6th - 8th grade	0	0	0	0	17	34	7	14

About three-fourths of the students in our Study were enrolled at the school which answered the Questionnaire, either in kindergarten or in first grade. The one exception is for the eighth graders in local schools where only about one-half of the students were enrolled in kindergarten or first grade of their present school. Correspondingly, 34 per cent of these students were enrolled in their present school in the sixth, seventh, or eighth grade which compares with only 14 per cent in residential schools. This may very well be due to a rather frequent change from residential school to local school attendance on the seventh grade level when the change to junior high school occurs. It may also be that students who have shown good progress during the first five or more years in a residential school transfer to local schools. This assumption would also support the fact revealed under Item 2 where it is shown that more students in the upper IQ range attend eighth grade in local schools than in residential schools. In general our figures indicate that, with the exception of eighth graders in local schools, about 75 per cent of blind students tend to stay at least for some years at the schools where they were initially enrolled and about 25 per cent change. Among the reasons for change of schools may be: change of the child's ability to see, e.g. improvement of vision or onset of blindness; transfer from one facility to the other; change of the family's residence.

(Item 6) The student started receiving braille reading instruction in:

	4th Grade				8th Grade			
	LS		RS		LS		RS	
Grade	f	%	f	%	f	%	f	%
Kindergarten	6	12	6	12	8	16	4	8
1st grade	37	74	41	82	35	70	40	80
2nd grade	2	4	2	4	1	2	2	4
3rd grade	4	8	1	2	3	6	1	2
4th grade	0	0	0	0	0	0	1	2
5th grade & above	0	0	0	0	1	2	0	0

Braille reading instruction was received in kindergarten or first grade by 86 per cent of the students in fourth grades of local schools and 94 per cent of residential schools, with only 12 per cent in both facilities reporting kindergarten as the starting point for braille reading instruction. Of the eighth graders, 86 per cent and 88 per cent in local and residential schools respectively began their braille reading instruction in kindergarten and first grade, with only 16 and 8 per cent respectively reporting that this started in kindergarten. There were only small numbers given for the beginning of braille reading instruction in grades from the second grade up. Therefore, no statistical comparison could be made between the braille reading test results for students receiving instruction during kindergarten and first grade and those who started on a later grade level.

(Item 7) Cause of student's blindness:

	4th Grade				8th Grade			
	LS		RS		LS		RS	
Cause	f	%	f	%	f	%	f	%
Retrolental Fibroplasia	25	50	29	58	39	78	31	62
Cataracts	2	4	3	6	0	0	0	0
Congenital Glaucoma	6	12	3	6	2	4	3	6
Optic Atrophy	4	8	5	10	3	6	4	8
Retinal defects	4	8	2	4	1	2	4	8
Other	9	18	8	16	5	10	8	16

The replies showed that on the fourth grade level, 50 per cent in local schools and 58 per cent in residential schools were blind as a result of retrolental fibroplasia. On the eighth grade level, this was the case for 78 and 62 per cent respectively. This decrease in the lower grades (years of birth 1955 and 1956) is due to the control of this cause of blindness in the years after 1954 when control measures began to take effect. The other causes of blindness enumerated showed only small percentages each. For certain statistical comparisons reported later on, all 54 cases of retrolental fibroplasia in local and residential fourth grades were combined and compared with the 46 non-retrolental fibroplasia cases. This could not be done for the eighth grades because the number of non-retrolental fibroplasia cases was too small.

(Item 8) The student's vision is (in the better eye or in both eyes with best obtainable correction):

	4th Grade				8th Grade			
	LS		RS		LS		RS	
Amount of Vision	f	%	f	%	f	%	f	%
Total blindness	24	48	24	48	27	54	22	44
Light perception	15	30	12	24	15	30	17	34
Light projection	2	4	1	2	1	2	1	2
Form perception	6	12	3	6	4	8	3	6
Less than 5/200	2	4	6	12	3	6	4	8
5/200	1	2	4	8	0	0	3	6

Total blindness and light perception was reported for 78 per cent of all students in the Study and only 11.5 per cent had more than form perception up to and including 5/200 Snellen measurement. Jones' (19, p.32) survey of all visually handicapped pupils registered with the American Printing House for the Blind gives only 40 per cent in the total blindness and light perception group. For the purposes of the Study, it was assumed that children with a visual acuity of 5/200 or less could not use their eyes for braille reading. The composition of our student sample shows that almost 88.5 per cent of the children participating had blindness ranging from total blindness to and including form perception and only 11.5 per cent had any measureable visual acuity with a maximum of 5/200.

(Item 9) Age at onset of student's blindness:

	4th Grade				8th Grade			
	LS		RS		LS		RS	
Age at Onset	f	%	f	%	f	%	f	%
Birth	35	70	36	72	44	88	41	82
First year	3	6	3	6	1	2	4	8
2 - 4 years	6	12	3	6	1	2	3	6
4 - 6 years	2	4	3	6	0	0	1	2
6 - 10 years	2	4	0	0	4	8	1	2
After 10 years	0	0	0	0	0	0	0	0

Birth was given as the age of onset of blindness for 70 per cent of the fourth graders in local schools and 72 per cent in residential schools. The percentages were even higher for eighth graders, 88 per cent in local and 82 per cent in residential schools. The difference between fourth and eighth graders is undoubtedly due to the larger percentage of retrolental fibroplasia cases (blindness at or shortly after birth) in the eighth grades. If we accept the available evidence that the age of about five years for onset of blindness divides those who have no visual memory from those who "may retain a more or less active visual frame of reference," (25, p.231) more than 90 per cent of the children in this Study have no useable visual memory unless they fall into the small group of children who have some low vision.

(Item 10) Check only the primary additional handicaps the student has (if any):

	4th Grade				8th Grade			
	LS		RS		LS		RS	
Additional handicaps	f	%	f	%	f	%	f	%
Hearing	1	2	2	4	1	2	0	0
Speech	5	10	1	2	1	2	0	0
Orthopedic	0	0	4	8	1	2	2	4
Emotional	6	12	5	10	2	4	4	8
Neurological	2	4	1	2	2	4	1	2
Other	0	0	3	6	2	4	1	2
None	36	72	34	68	41	82	42	84

In the instructions sent to the participating schools, we requested that besides the visual acuity limitation, only children who do "not have any marked additional handicap" should be included in the Study. Item 10 provides a check for the degree to which our request had been followed. In the fourth grades, 72 per cent in local schools and 68 per cent in residential schools were given as having no additional handicaps. Thus, more than three-fourths had no other handicap besides blindness. Among the other listed handicaps, 8.5 per cent were emotional and 3.5 per cent each, speech and orthopedic. If our request was followed, it must be assumed that the additional handicaps of the few children included in the Study were "not marked."

Summary of Statistics Describing Reading Behavior of the Students

The following data and discussions of items 11-23 deal with the description of the reading behavior of the 200 students included in the Study. Where applicable, the reading behavior data will be compared with the answers given by the teachers in Questionnaire A which described the present status of braille reading instruction, as practiced in local and residential schools for the blind.

(Item 11) The student reads with:

	4th Grade				8th Grade			
	LS		RS		LS		RS	
	f	%	f	%	f	%	f	%
Left hand	1	2	4	8	7	14	5	10
Right hand	6	12	13	26	8	16	11	22
Either hand	1	2	1	2	0	0	0	0
Both hands	42	84	32	64	35	70	34	68

Of the 200 students in the Study, 17 (8.5 per cent) were observed using the left hand; 38 (19 per cent) using the right hand; 2 (1 per cent) using either hand; and 143 (71.5 per cent) using both hands. There were more children who used both hands in local schools (42 or 84 per cent in fourth grades and 35 or 70 per cent in eighth grades) than in residential schools (32 or 64 per cent and 34 or 68 per cent respectively). Conversely, there were more students who used the right hand in residential schools (13 or 26 per cent in fourth grade and 11 or 22 per cent in eighth grade) than in local schools (6 or 12 per cent and 8 or 16 per cent respectively). The data also show that there were more left-hand readers in the eighth grade (12 students) than in the fourth grade (5 students). Although this information was not given, it can be assumed that some of the children reading with the left hand are actually left-handed. The fact that there were more left-hand readers in the eighth grade than in the fourth grade may have something to do with the greater need for note-taking on the higher grade level. In note-taking, students usually use the left hand for reading and the right hand for taking notes. Also, fourth graders may adhere to standards set by their teachers, while eighth graders may have become more independent from them. The most important fact revealed by the data is that almost three-fourths of the students read with both hands.

This finding on the actual reading hand-use of the students corresponds quite closely to the hand-use which is encouraged by the teachers. (See Chapter I, Item 5). Teachers in local and residential schools show an almost equal percentage (87 and 85 per cent respectively) as encouraging the use of both hands. However, the above data of actual hand-use indicate that a smaller percentage of students in residential schools use both hands than do so in local schools.

(Item 12) If he uses "both" hands does he:

	4th Grade				8th Grade			
	LS		RS		LS		RS	
	f	%	f	%	f	%	f	%
Use left hand to find next line	24	48	15	30	11	22	19	38
Use right hand to find next line	0	0	2	4	3	6	2	4
Read next line with left hand before finishing preceding line with right hand	4	8	4	8	15	30	7	14
Read with both hands moving together in "parallel" motion	14	28	11	22	6	12	6	12
Omits	8	16	18	36	15	30	16	32

Of the 143 students who used both hands in reading, 69 (48 per cent) used the left hand to find the next line. Reading with both hands moving together in "parallel" motion was done by 37 (26 per cent). There were only 7 students (5 per cent) who used the right hand to find the next line and implicitly read with the left hand. Thirty students (21 per cent) read the next line with the left hand before finishing the preceding line with the right hand. There were no students who read the next line with the right hand before finishing the preceding line with the left hand. The distribution by grades shows that reading with both hands together in "parallel" motion was about twice as often found among fourth graders (25 students) than among eighth graders (12 students). On the other hand, reading ahead with the left hand before finishing the preceding line with the right hand was done by almost three times as many students in the eighth grade (22 students) than in the fourth grade (8 students). Also, there were more than twice as many eighth graders who did this in the local schools (15 students) than in the residential schools (7 students). It stands to reason that many fourth graders who read with both hands in "parallel" motion become, by the time they are in the eighth grade, readers who read ahead with the left hand before finishing the preceding line with the right hand. The statistical significance of these facts in relation to reading comprehension and reading rate will be discussed later. This also holds true for other subsequent items.

(Item 13) If the student reads with one hand (left or right), his reading finger (s) is (are):

	4th Grade		8th Grade	
	LS f	RS f	LS f	RS f
Index finger (1st finger only)	3	11	10	11
2nd finger only	0	0	1	0
Index and 2nd fingers	2	3	3	5
Index, 2nd, and 3rd fingers	2	3	1	0
Index, 2nd, 3rd, and 4th fingers	0	0	0	0
Other combinations	1	1	0	0
Omits	42	32	35	34

There were only small numbers in this distribution and there are only two facts that can be stated: of the 57 students who were one-hand readers, 35 (61 per cent) used the index finger only for reading; there were no one-hand readers who used all fingers of their reading hand.

(Item 14) If the student reads with both hands (left and right), his reading fingers are:

	4th Grade		8th Grade	
	LS	RS	LS	RS
	f	f	f	f
Both index fingers	24	24	26	22
Index and 2nd fingers of both hands	10	6	4	6
Index, 2nd and 3rd fingers of both hands	3	0	3	2
Index, 2nd, 3rd, and 4th fingers of both hands	1	0	1	1
Index finger of one hand, all 4 fingers of other hand	4	2	0	1
Other combinations	0	0	1	2
Omits	8	18	15	16

Of the 143 students who read with both hands, 96 (67 per cent) used the index fingers, and 26 (18 per cent) used the index and second fingers. The remaining 21 students (15 per cent) used more than the two fingers of each hand. It must be kept in mind that in cases where more fingers than the index finger and, perhaps the second finger are used, the actual reading may be done by the index finger, and perhaps the second finger only, while the other fingers most likely rest on the paper only tracing the lines.

If we compare these figures on the actual finger-use with the data of Questionnaire A, Item 7, we find that a far larger percentage of children (67 per cent) actually used both index fingers than teachers in local and residential schools (42 per cent) encouraged. Conversely, there were more teachers (58 per cent) who encouraged a variety of finger-use (or left it to the childrens' preference) than students did in their actual reading (33 per cent).

(Item 15) The student holds his braille book when reading:

	4th Grade				8th Grade			
	LS		RS		LS		RS	
	f	%	f	%	f	%	f	%
Approximately parallel	44	88	34	68	38	76	30	60
Slanted to the right	5	10	10	20	4	8	12	24
Slanted to the left	1	2	5	10	4	8	7	14
On lap, even though reading at desk	0	0	1	2	1	2	1	2
Other	0	0	0	0	1	2	0	0
Unanswered	0	0	0	0	2	4	0	0

Of the 200 students in the Study, 146 (73 per cent) held their braille books while reading approximately parallel in relation to their body. The braille book was slanted to the right for 31 (15.5 per cent) and slanted to the left for 17 (8.5 per cent) of the students. Three students (1.5 per cent) held their books on their laps, even though reading at a desk.

The distribution shows that more children in local schools (88 per cent in fourth grade and 76 per cent in eighth grade) held their books parallel as compared with those in residential schools (68 and 60 per cent respectively). This can be explained by the fact that more desks in local schools are constructed in such a way that a parallel position must be used. The desk may, for instance, be slanted toward the body of the child and have a rim in front. Also, the seeing children in local schools hold their books parallel and this may have had its influence on the blind children with some sight. Conversely, there were more children in residential schools, both in the fourth and eighth grades, who held their books either slanted to the right or slanted to the left. Many residential schools use desks which have tops similarly constructed to those in local schools but there are many others who use flattop desks without rims which make it possible to hold books in slanted positions according to the student's preference. For the three children who held their books on their laps, even though sitting at their desks, the desks may have been too high or the children may have been too short.

(Item 16) The student reads:

	4th Grade				8th Grade			
	LS		RS		LS		RS	
	f	%	f	%	f	%	f	%
In an even flow	29	58	27	54	35	70	36	72
Stopping and rereading words frequently	20	40	20	40	12	24	14	28
Making frequent return sweeps over the line he reads or larger part of it	1	2	2	4	3	6	0	0
Unanswered	0	0	1	2	0	0	0	0

According to the teachers' observations, 127 (63.5 per cent) of the students read in an even flow. Stopping and rereading words frequently was observed for 66 (33 per cent) of the students. Only 3 per cent of all students made frequent return sweeps over the line or larger parts of it when reading.

The distribution shows that the pattern of reading flow was the same for children in local and in residential schools. However, fewer students read in an even flow in the fourth grades (58 and 54 per cent for local and residential schools respectively) than in the eighth grades (70 and 72 per cent respectively). This was to be expected as a result of increased skill in reading.

(Item 17) The student "rubs" letters:

	4th Grade				8th Grade			
	LS		RS		LS		RS	
	f	%	f	%	f	%	f	%
Often	6	12	6	12	1	2	0	0
Occasionally	13	26	15	30	4	8	11	22
Hardly ever	31	62	29	58	45	90	39	78

Of the 200 students, 144 (72 per cent) hardly ever did any "rubbing" of letters. This was done occasionally by 43 (21.5 per cent), and often by only 13 (6.5 per cent). Students who "rub" letters often were practically all found in the fourth grade. There were slightly more students in residential schools who "rub" letters occasionally (30 per cent in fourth grade and 22 per cent in eighth grade) than in local schools (26 per cent in fourth grade and only 8 per cent in eighth grade). Conversely, there were fewer students in residential schools who hardly ever "rub" letters (58 per cent in fourth grade and 78 per cent in eighth grade) than in local schools (62 per cent and 90 per cent respectively). The decrease in "rubbing" from fourth to eighth grade was also to be expected as a result of increased skill in reading.

(Item 18) The student loses his place:

	4th Grade				8th Grade			
	LS		RS		LS		RS	
	f	%	f	%	f	%	f	%
Often	5	10	2	4	2	4	0	0
Occasionally	14	28	16	32	5	10	3	6
Hardly ever	31	62	31	62	42	84	46	92
Unanswered	0	0	1	2	1	2	1	2

Of the 200 students, 150 (75 per cent) lost their places hardly ever when reading. This was done occasionally by 38 (19 per cent) and often by only 9 (4.5 per cent).

Losing the place often and occasionally when reading was more frequently found among fourth graders than among eighth graders, with no marked difference between students in local and residential schools. The only slight difference was found between eighth grade students in residential schools where 92 per cent lost their places hardly ever while in local schools this was done by only 84 per cent. The decrease in losing the place when reading from fourth to eighth grade was also to be foreseen because of the increased skill in reading among the students on the higher grade.

(Item 19) The student accompanies his reading with silent speech movements (lips, larynx):

	4th Grade				8th Grade			
	LS		RS		LS		RS	
	f	%	f	%	f	%	f	%
Often	11	22	9	18	7	14	4	8
Occasionally	11	22	11	22	8	16	5	10
Hardly ever	28	56	30	60	35	70	40	80
Unanswered	0	0	0	0	0	0	1	2

Silent speech movements accompanying reading were observed hardly ever in 133 (66.5 per cent) of the 200 students, occasionally in 35 (17.5 per cent), and often in 31 (15.5 per cent).

They occurred more frequently, that is often and occasionally, with fourth graders than with eighth graders (84 per cent against 48 per cent). Conversely, more eighth graders showed silent speech movements hardly ever than fourth graders (75 against 58 students). There were some slight differences between local schools and residential schools. More children in local schools showed silent speech movements often or occasionally than did those in residential schools (37 against 29 students).

(Item 20) The student's primary mannerism in reading is:

	4th Grade				8th Grade			
	LS		RS		LS		RS	
	f	%	f	%	f	%	f	%
Rocking	7	14	7	14	3	6	4	8
Head movements	3	6	4	8	5	10	4	8
Eye-poking	6	12	6	12	5	10	1	2
Others	3	6	3	6	3	6	2	4
None	31	62	30	60	34	68	39	78

Of the 200 students, 134 (67 per cent) showed no mannerisms at all. Among the three specific mannerisms mentioned, (rocking, head movements, and eye-poking) only rocking was done by more than 10 per cent of the students, that is by 21 students (10.5 per cent).

The distribution shows that fourth grade students had more mannerisms than eighth graders (39 fourth graders against 27 eighth graders). So far as mannerisms are concerned, there was practically no difference between children in local and residential schools, except that eye-poking was done by five eighth graders in local schools and by only one eighth graderin a residential school. This is reflected in a smaller number of eighth graders in the local schools who had no mannerisms as compared with those in residential schools (34 against 39 students).

(Item 21) The student when reading is:

	4th Grade				8th Grade			
	LS		RS		LS		RS	
	f	%	f	%	f	%	f	%
Relaxed	41	82	44	88	43	86	41	82
Tense	9	18	6	12	6	12	9	18
Unanswered	0	0	0	0	1	2	0	0

Most of the 200 students in the Study were relaxed when reading (169 or 84.5 per cent). Tenseness was observed in 30 students (15 per cent). There was no marked difference between fourth and eighth graders nor between local and residential schools.

(Item 22) The student's posture when reading is:

	4th Grade				8th Grade			
	LS		RS		LS		RS	
	f	%	f	%	f	%	f	%
Erect	38	76	33	66	30	60	36	72
Bent	10	20	15	30	16	32	13	26
Excessively bent	2	4	2	4	4	8	1	2

A majority of the students had an erect posture when reading (137 or 68.5 per cent). Bent posture was observed in 54 (27 per cent) and excessively bent posture in only 9 (4.5 per cent) students. There were somewhat fewer students showing erect posture in the eighth grade than in the fourth grade (66 against 71 students). Conversely, there were more students showing bent posture in the eighth grade than in the fourth grade (29 against 25). Four eighth graders in local schools showed excessively bent posture while only one did so at a residential school.

(Item 23) Outside of the classroom the student reads:

	4th Grade				8th Grade			
	LS		RS		LS		RS	
	f	%	f	%	f	%	f	%
Avidly	13	26	15	30	20	40	25	50
Occasionally	28	56	25	50	24	48	20	40
Rarely	7	14	9	18	5	10	5	10
Not known	2	4	1	2	1	2	0	0

Among the 200 students, there were 73 (36.5 per cent) who read avidly, 97 (48.5 per cent) or about one-half who read occasionally, and 26 (13 per cent) who read rarely, according to their teachers' observations. There were more avid readers among the eighth graders than among the fourth graders (45 against 28) and correspondingly fewer who read occasionally or rarely (54 eighth graders against 69 fourth graders). If we compare the numbers of avid readers in local and residential schools, there were fewer in local schools (33) than in residential schools (40).

Conclusion

The 200 students in the Study (50 each in fourth and eighth grades of local and residential schools) turned out to be a group with more pupils in the higher IQ range, particularly on the eighth grade level. Retrolental fibroplasia was the cause of blindness of more than half of the fourth graders and of 70 per cent of the eighth graders. Only 11.5 per cent had measurable visual acuity with a maximum of 5/200. Age at onset of blindness was at birth for most of the students. In reading braille, more than 70 per cent used both hands, and of them almost one-half used the left hand to find the next line. One-fourth read by moving both hands together in "parallel" motion. Index fingers were the preferred reading fingers. Reading in an even flow, not "rubbing" letters, not losing the place while reading, and reading without silent speech movements was done more frequently by eighth graders than by those in the fourth grade. More than one-third of the students were considered "avid" readers outside of the classroom.

Summary

Data on certain personal characteristics and on the reading behavior of the 200 students in the testing phase of the Study were secured. The sample consisted of 50 students each in fourth grades of local and residential schools and in eighth grades of local and residential schools.

The distribution of IQ's showed that larger percentages were in the upper than in the lower IQ ranges, with this trend being more pronounced in local schools and for students in the eighth grades. Only the fourth grade students showed a reasonably "normal" distribution of IQ's About three-fourths of the students had been enrolled in the schools which they were attending at the time of the testing either in kindergarten or in first grade. About 75 per cent of them received their beginning braille reading instruction in the first grade.

Retrolental fibroplasia was the cause of blindness of 54 per cent of the fourth grade pupils and of 70 per cent of those in the eighth grades. Total blindness, light perception and light projection were reported for 80.5 per cent, and measurable visual acuity with a maximum of 5/200 for only 11.5 per cent of the students. The age at onset of blindness was at birth for 71 per cent of the fourth grade and for 85 per cent of the eighth grade students.

More than 75 per cent of the students had no additional handicaps, while the remaining students had some handicaps which presumably were "not marked" since this was requested as a condition for inclusion in the sample of the Study.

So far as reading behavior of the students is concerned, more than 70 per cent used both hands in reading, about 20 per cent the right hand, and almost 10 per cent the left hand.

Of the students who used both hands, almost one-half used the left hand to find the next line and one-fourth read with both hands moving together in "parallel" motion. About one-fifth read the next line with the left hand before finishing the preceding line with the right hand. The latter was done by more students in the eighth grade as well as in the local schools.

More than 60 per cent of the one-hand readers and of the both-hand readers read with their index finger(s). Index and second fingers ranked next in frequency.

Most students (73 per cent) held their braille books approximately parallel to their bodies while reading.

Reading in an even flow, rarely "rubbing" letters, and rarely losing the place in reading were found more frequently among eighth grade students than among those in fourth grade.

Sixty to 78 per cent of the students showed no mannerisms while reading, with larger percentages for eighth graders than for fourth graders. Of the mannerisms only "rocking" was done by slightly more than 10 per cent, most of them in the fourth grade.

When reading, 85 per cent of the students were relaxed and about 70 per cent sat straight.

Teachers considered that about one-half of the students were reading only occasionally outside of the classroom, while more than one-third were considered "avid" readers.

III

ANALYSIS AND INTERPRETATION OF THE TEST DATA

Before presenting the statistical results of the tests and their significance, two items which deal with the personal characteristics of the students will be elaborated on: the chronological ages for each of the participating student groups and their grade placement, and their intelligence quotients. These characteristics will be compared with norms for seeing students.

Chronological Age

Table 1 shows the means and standard deviations of the chronological ages in months for the fifty students in each of the fourth and eighth grades of local and residential schools at the time the tests were administered.

Table 1

Means, Standard Deviations (SD), and _t_ Tests of Chronological Age in Months for Fourth and Eighth Grade Students in Local and Residential Schools

	4th Grade			8th Grade		
	LS	RS	_t_	LS	RS	_t_
N	50	50		50	50	
CA Mean	129.2	133.8	n/s	167.2	172.3	2.51*
SD	11.6	14.3		8.4	11.6	

*p <.05

To determine whether the age differences between students in local schools and residential schools were significant, _t_ tests were performed. On the fourth grade level, students in residential schools were 4.6 months older than those in local schools but the difference was not significant. On the eighth grade level, students in residential schools were 5.1 months older than those in local schools and this difference reached the 05 level of significance.

Table 2 gives a comparison of the chronological age (in years) and the standard deviations (in months) of the students in our Study with age norms for seeing students on the same grade level. The data for the latter were taken, and adjusted for the time at which the tests were given, from Lennon and Mitchell (22).

Table 2

Means and Standard Deviations of Chronological Age of Fourth and Eighth Grade Students in Local and Residential Schools, and Norms for Seeing Students

	LS	RS	Seeing	LS	RS	Seeing
Mean (in years)	10.8	11.2	10.0	13.9	14.4	14.1
SD (in months)	11.6	14.3	8.5	8.4	11.6	9.2

Blind students on the fourth grade level were somewhat older than their seeing peers; the difference was 0.8 years in local schools and 1.2 years in residential schools. On the eighth grade level, the differences were only small; local school students were 0.2 years younger and residential school students 0.3 years older than their seeing peers. These findings differ markedly from previously reported grade-age statistics. About twenty years ago Lowenfeld (24, p.11) reported 2.5 years overage for blind as compared with seeing students for fourth graders and 2.8 years overage for seventh graders. Hayes (13, p. 279) wrote in 1941 as follows: "As a matter of fact we do find an age-grade retardation averaging from two to three years in most residential schools for the blind, and extending to four years or more in some schools or grades."

It is also interesting to compare the variability of age within each grade which is expressed by the standard deviations. Residential school students on both grade levels show greater age variability (14.3 months and 11.6 months) as compared with students in local schools (11.6 months and 8.4 months respectively). Compared with their seeing peers, fourth grade students in local schools and in residential schools have somewhat greater age variability. Eighth grade students in local schools show less age variability and those in residential schools a slightly greater age variability than their seeing peers. This indicates that blind students on the fourth grade level are, so far as ages are concerned, a less homogeneous group than seeing children in fourth grades. On the eighth grade level, those in local schools are slightly more homogeneous and those in residential schools, again, less homogeneous than their seeing grade groups. Chronological-age promotion which is more widely practiced in local schools, with seeing and to some extent also with blind pupils, than in residential schools is most likely responsible for these differences.

The substantial reduction of the age-grade retardation of twenty years ago has a number of explanations, largely environmental in character. A few of these shall be discussed. Programs for early parent education and for the pre-school education of blind children are now wide-spread while they were practically nonexistent some twenty years ago. This gives blind children a "head start" in educational opportunities. Nursery schools and kindergartens, the latter often being an integral part of public school education, now accept blind children, but did so only rarely some twenty years ago. The growth of educational facilities for blind children in local schools has created an environment in which blind children work and compete with their seeing peers. Thus, standards for their achievement have become the same as those for seeing children. Local school education for blind children has undoubtedly exerted an influence in this respect on the educational standards of residential schools also, and, in general, has created an atmosphere of greater expectations of blind children. As an example, it might be mentioned that most residential schools assumed that blind children cannot learn arithmetic and geometry as well as seeing children (13, p.161). Also, many schools for the blind did not give physics or chemistry courses because it was assumed that blind children were not capable of advancing in these subjects beyond what a general science course offered (32, p. 169-171). Blind children of today have much more access to information and live in a society which is much more audio-oriented than in the past. Earlier identification through school census, improved teacher training, the higher value placed on education, the wider use of tests, better vocational opportunities with the resulting improvement in motivation, the vastly greater amount of available materials, in braille as well as on records and tapes, and the increased use of radio and television are some additional factors which have had influence in raising the educational achievement of blind children.

Intelligence Quotients

The distribution of the students' IQ's have already been presented (Chapter II, Item 2). The Student Description forms did not provide for the entry of individual IQ's but asked that the individual student's IQ be entered in six ranges beginning with the lowest of 70-79 and ending with the highest, 120 and up. The means and medians of these grouped data are presented in Table 3.

Table 3

Means and Medians of IQ's for Fourth and Eighth Grade Students in Local and Residential Schools

	4th Grade		8th Grade	
	LS	RS	LS	RS
N	50	50	50	50
Mean IQ	100.4	98.6	113.6	110.2
Median IQ	98.2	97.0	118.3	110.8

The means of the fourth grade students in our Study corresponded closely to the average IQ of 100. The means of the eighth grade students were considerably above this average IQ. As previously discussed, blind students whose IQ's are low may be found in ungraded classes rather than in the regular eighth grade where only the more capable students are enrolled, and according to Hayes (14, p. 151) to "the selective process as children pass upward in school as well as their intellectual development."

Hayes (13, p.85) gave IQ means for 1,367 students in nine schools for the blind according to their amount of vision. His IQ means for students whose vision ranges from total blindness to less than 5/200 were considerably below those found in this Study.

The means and medians on the fourth grade level show that although students in local schools had a slightly higher mean IQ than those in residential schools, the differences between the two groups were rather small. On the eighth grade level, both means and medians were somewhat higher for students in local schools than for students in residential schools (means by 3.4 IQ points).

In order to find out whether the differences between the distribution of IQ's for students attending residential schools were significant, a chi-square test was performed. The chi-square for the fourth graders was not significant. The chi-square for the eighth graders was 11.6 which is statistically significant beyond the .05 level. The difference, though only 3.4 IQ points and therefore not very meaningful, was in favor of students attending local school facilities.

Reading Comprehension

In order to determine the reading comprehension of the 200 children in the Study, the Reading Part of the Sequential Test of Educational Progress (STEP) and the Paragraph Meaning part of the Stanford Achievement Test (SAT) were administered, as previously explained.

STEP Reading Comprehension. The STEP Form 4B was used with fourth grade students and the STEP Form 3B with eighth grade students. The material was supplied in braille by the American Printing House for the Blind and they also provided "Supplemental Directions for Administering Braille Tests." The teachers were asked to follow these directions. The following paragraph indicates the only major departure in administering the braille tests as compared with the regular administration of the tests to seeing students: "These tests are power tests rather than speed tests. With the exception of the Listening Tests for which there are no time limits, the times given here are merely suggested as an administrative convenience. They were derived by increasing the regular administration times by two-and-one-half or more. If this is not adequate time for extremely slow readers, additional time should be allowed." Therefore, the blind children in the Study were given at least 2½ times the time than allowed for seeing children.

The STEP reading test requires that the number of right answers given by the student be recorded for which a converted score is provided. The converted score can be used as such, but in order to make these scores comparable to other data, they were converted to grade placement scores.

Table 4

Means and Standard Deviations of STEP Grade Placement for Fourth and Eighth Grade Local and Residential School Students

	4th Grade			8th Grade		
	LS	RS	t	LS	RS	t
N	50	50		50	50	
Mean	5.08	4.62	n/s	9.76	9.22	n/s
SD	1.92	1.25		2.40	2.06	

Table 4 indicates that fourth grade students in local schools were about one-half year above their grade placement and those in residential schools only slightly above. However, the difference between the means of the two fourth grade groups was not significant. The means for the eighth grade students show that those in local schools were about one year and three months above their normal grade placement and those in residential schools were about eight months above. Likewise, the difference between the means of the eighth grade local school students and residential school students was not significant. The above-average IQ's of blind students on the eighth grade level explain, at least in part, their above-normal grade placement.

The STEP Manual for Interpreting Scores--Reading (34, p.23) gives converted medians and lower and upper quartiles. The converted scores of the blind students in our group were compared in Table 5 with the score norms given in the Manual. It is recognized that the blind students in this Study may differ in some respects from the STEP and SAT standardization groups. For instance, the intelligence level of the eighth grade blind students was nearly one standard deviation higher than that of the seeing population on which these tests were normed. The 1963 SCAT-STEP Supplement: Test Performance in Urban Schools (33, p.7) also gives norms which are based on tests administered to students in urban communities (cities with populations of 100,000 or more). These averages are also presented in Table 5.

Table 5

Comparison of Converted STEP Scores for Local and Residential Schools for the Blind with General and Urban Norms*

	Blind Students LS	Blind Students RS	General Norms	Urban Norms
		4th Grade		
Upper Q	260	252	253	256
Median	247	244	243	245
Lower Q	239	239	233	235
		8th Grade		
Upper Q	294	288	284	286
Median	287	280	271	276
Lower Q	271	270	257	262

*The general norms for fourth grade are based on the tests of 638 students in 53 schools, and for eighth grades of 899 students in 42 schools.

The converted STEP scores in the Manual range for fourth grade from 228 to 289 (62 points difference between lowest and highest scores) and for eighth grade from 236 to 303 (68 points difference between lowest and highest scores).

The medians for blind students in fourth grade correspond almost exactly with the general and urban norms; on the eighth grade level, they are slightly higher for residential schools and considerably higher (16 per cent of the total points difference) for local schools than the general and urban norms. The upper and lower quartiles for fourth grades are only slightly different from the general and urban norms. The upper quartiles for for eighth grades are somewhat above the general and urban norms and the lower quartiles considerably above (about 12 per cent of the total points difference).

In evaluating the reading comprehension of the blind students, it must be kept in mind that the IQ averages were normal for the fourth graders, both in local and residential schools. However, on the eighth grade level, the IQ averages were considerably above normal. Since verbal intelligence and scores on reading tests are highly correlated (12, p.458), it was to be expected that reading comprehension on the eighth grade level would also tend to be above the normal for that grade.

The results of the STEP Reading tests show that the reading comprehension of blind children is, in general, at least equal to that of seeing children on the fourth grade level, and may be superior on the eighth grade level.

SAT Reading Comprehension. The SAT Form X, Intermediate I Battery was used with fourth grade students and SAT Form X, Advanced Battery was used with eighth grade students. Again, the material was supplied in braille by the American Printing House for the Blind which also provided their Directions for Administering Braille Editions. In the SAT tests, as in the STEP tests, the directions allow a 2½ times increase of testing time and stress that this may not be adequate for extremely slow readers who should be given an additional time allowance. The SAT tests give a grade score which corresponds to the number of correct responses given by each student.

Table 6 presents the grade placement means and standard deviations for fourth grade students in local and residential schools.

Table 6

Means and Standard Deviations of SAT Grade Placement for Fourth and Eighth Grade Local and Residential School Students

	4th Grade			8th Grade		
	LS	RS	*t*	LS	RS	*t*
N	50	50		50	50	
Mean	4.40	3.90	n/s	9.12	8.80	n/s
SD	1.61	1.01		2.72	2.10	

The grade placement mean for fourth grade students in local schools corresponded almost exactly with their actual grade placement at the time the tests were given. The grade placement mean for fourth grade students in residential schools was about six months below their actual grade placement. However, the difference between the means of local and residential school students was not significant. The grade placement mean for eighth grade students in local schools was about seven months above their actual grade placement and that of residential school students only about three months above. The difference between the means for local and residential school students was again not significant.

A comparison of the STEP grade placement means (Table 4) and of the SAT grade placement means (Table 6) shows that the SAT means were consistently below the STEP means, but that the amount and direction of the differences were similar. Apparently blind children found the STEP tests generally easier than the SAT tests. For both tests, differences between local and residential schools, although always in favor of the local schools, were not significant.

The results of the SAT reading test also show that the reading comprehension of blind children on the fourth grade level in local schools was, in general, equal to that of seeing children, and in residential schools slightly below. On the eighth grade level, it was superior in local as well as in residential schools.

The observations made about the higher IQ of the blind eighth graders in this Study in connection with the results of the STEP reading test are also applicable to the SAT test.

Reading Rate

Comprehension and Rate of Reading are the two components which make up what could be termed "reading efficiency." An efficient reader is, therefore, one who reads with good comprehension at a good rate.

In connection with the administration of the STEP reading test, the teachers were asked to time the students according to the Directions for the Rate of Reading Test (see Appendix H). Thus, it was possible to determine the words per minute read by each student. Table 7 gives the means and standard deviations of words read per minute for fourth and eighth grade students in local and residential schools.

Table 7

Means and Standard Deviations of Reading Rate for Fourth and Eighth Grade Students in Local and Residential Schools

	LS	RS	t	LS	RS	t
N	50	50		50	50	
Mean	83.75	71.60	n/s	149.22	116.44	3.45*
SD	40.02	31.36		43.79	50.98	

*$p < .01$

Students in the local schools had higher Reading Rate means than those in residential schools, both on the fourth and eighth grade levels. The difference between the means on the fourth grade level was not statistically significant, whereas the difference on the eighth grade level was significant at less than the .01 level.

The data of this Study dealing with reading comprehension (STEP and SAT grade placements) and with reading rate on the fourth grade level show that students in local schools did not differ significantly from those in residential schools. Although the eighth grade students in local schools were not significantly better in reading comprehension than students in residential schools, the reading rate was significantly higher for the local school students. Therefore, local school students on the eighth grade level must be considered to be more efficient readers than their peers in residential schools.

In evaluating this conclusion, it must be remembered that the IQ differences between fourth graders attending local schools and those attending residential schools were not significant, while on the eighth grade level local school students had a significantly higher IQ than those in residential schools.

Tables 8 and 9 compare the various averages of reading rates found for fourth and eighth grade students in this Study with those in four different publications: B. Lowenfeld's 1945 Study (24, p.14); norms reported for fourth and eighth grade visual readers in the SRA Diagnostic Reading Tests tabulated December 1957 (SRA Code Number 7-1414); norms reported for visual readers by Harris in 1961 (12, p.508); and norms for visual readers reported by Taylor and others in 1960 (37, p.12).

The Tables present for comparison, when available, the upper quartile, median, and lower quartile; the range of the middle 80 per cent which disregards the upper and lower extreme 10 per cent; and the maximum rate achieved by an individual student. With the exception of the last-mentioned item, all averages given are derived from groups of students. The maximum rates were achieved by a single student of his grade and in his type of school facility and are, therefore, of no significance for the group of students tested.

Table 8

Comparison of Reading Rates for Blind and Seeing Fourth Grade Students as Reported in Various Studies

	Blind Students			Seeing Students		
	Present Study		Lowenfeld	SRA	Harris	Taylor
	LS	RS	1945		1961*	1960
Upper Q	108.5	90	79	185	170	
Median	77	61.5	58	150	155	158
Lower Q	58	50.4	45	100	120	
Range (middle 80%)	44-135	39-114	36-105			
Maximum	220	175	230			

*The three rates given are the highest, median, and lowest rates of eight standardized reading tests. (12, p.508)

Table 7

Comparison of Reading Rates for Blind and Seeing Eighth Grade Students as Reported in Various Studies

	Blind Students			Seeing Students		
	Present Study		Lowenfeld		Harris	Taylor
	LS	RS	1945*	SRA	1961**	1960
Upper Q	164.0	152.5	76	253	267	
Median	150.5	110.0	62	212	237	204
Lower Q	122.5	77.0	50	171	188	
Range (middle 80%)	92-200	55-182	33-93			
Maximum	279	276	132			

*Rates are for seventh grade students.

** The three rates given are the highest, median, and lowest of six standardized reading tests. (12, p.508)

A comparison of the fourth grade reading rates in the present Study with those in the Lowenfeld 1945 (24, p.14) study shows that all averages are considerably higher. It must be remembered that the students in the Lowenfeld 1945 study read their tests in braille Grade 1 or braille Grade 1½ which is either not contracted or far less contracted than braille Grade 2, which was used throughout in the present Study. If we compare the quartiles for blind readers with those given for seeing readers, we find that on the fourth grade level, seeing students read about twice as fast as the blind students in local schools and a little more than twice as fast as the blind students in residential schools.

A comparison of the eighth grade reading rates in the present Study with those given in the Lowenfeld 1945 study, shows that the eighth graders in our present Study read about twice as fast than the seventh graders did about twenty years ago. Comparison of the present braille reading rates for blind eighth grade students with those given for seeing eighth grade students, indicate that the local school students' median of 150.5 is not much below the 212, 237, and 204 median rates given for seeing students; seeing students read about 1½ times as fast as blind students in local schools. Comparison of the median rate for residential schools students, shows that the seeing students read about twice as fast.

The range of the middle 80% confirms, in general, our conclusions. On the fourth grade level, the rates of the ninetieth percentile of local school readers (135) almost approaches the visual reading rate medians; that of residential school readers (114) is somewhat further below. The same can be stated for the eighth grade readers. The reading rates of the tenth percentile for both grade levels are, of course, considerably below the stated medians.

The maximum rates indicate that a blind student who is a top rapid reader may be able to read at a considerably faster rate than the rate averages for seeing students in his grade. It was made certain that each reader who achieved the maximum rates showed at least normal scores in comprehension.

The findings of this Study indicate that on the fourth grade level blind children, like those included in our tests, need about twice as much reading time as seeing children; on the eighth grade level, they need about 1½ to twice the time as compared with seeing children.

This result differs markedly from current practices in allowing for blind children 2½ to 3 times and even more reading time than for seeing children. This practice is based on surveys done by Hayes (13, p.117-118) from which he drew the following conclusion: "The results as a whole indicate that under present conditions, blind pupils attain at the end of their elementary school work a rate of reading only about one-third of that of seeing pupils of the fifth grade, and that they make no appreciable advance during the high school years." As a result of the present Study, revision of the time allowance to about twice the time as compared with seeing children seems to be indicated.

This would not give blind children an advantage in their test achievements as compared with seeing children. The results reported in Table 4 (STEP Grade Placement Averages) and in Table 6 (SAT Grade Placement Averages) clearly indicate that the eighth grade students in the present Study achieved considerably better results than the norms for seeing students. This may be due, in part, to the time premium given to the blind students as a result of the 2½ to 3 times longer time allowance when a time allowance of only 1½ to 2 times was actually needed and justified.

Comprehension and Reading Rate

The intercorrelations which are presented in Table 12 show that reading rate and reading comprehension (STEP and SAT scores) correlate only moderately with rs ranging from .02 to .54. It deemed interesting to examine whether students who read at a good rate also read with good comprehension and whether those who read at a slow rate also read with poor comprehension. For this purpose, the reading rate scores were divided at the median with the upper half representing the high reading rate group and the lower half the low reading rate group. The differences between the mean STEP and SAT scores for the "high" and "low" reading rate groups were tested for significance. Table 10 presents the data for 100 fourth grade students (local and residential schools combined); Table 11 gives these data for 50 students of eighth grades in local schools; and for 50 eighth grade students in residential schools.

Table 10

Differences of STEP and SAT Reading Scores for Fourth Grade Students with High Reading Rates and Low Reading Rates

Divided on Median of Reading Rate (RR) Scores	High RR	Low RR	Difference	t
4th Grade (LS and RS)				
N	50	50		
STEP Score				
Mean	5.22	4.49	0.73	2.43*
SD	1.96	1.12		
SAT Score				
Mean	4.49	3.81	0.68	2.77**
SD	1.55	1.05		

*p <.05
**p <.01

Table 11

Differences of STEP and SAT Reading Scores for Eighth Grade Students with High Reading Rates and Low Reading Rates

Divided on Median of Reading Rate (RR) Scores	High RR	Low RR	Difference	t
8th Grade (LS)				
N	25	25		
STEP Score				
Mean	10.68	8.84	1.84	3.01**
SD	1.87	2.51		
SAT Score				
Mean	10.20	8.10	2.10	3.13**
SD	2.42	2.35		
8th Grade (RS)				
N	25	25		
STEP Score				
Mean	9.95	8.50	1.45	2.69*
SD	1.69	2.13		
SAT Score				
Mean	9.15	8.45	0.70	n/s
SD	2.03	2.10		

*$p < .05$
**$p < .01$

The difference in comprehension scores between the high reading rate students and the low reading rate students were all in favor of the high reading rate groups, ranging from 0.68 to 2.10 grade score points. They were all significant at less than the $<$.01 or .05 level with one exception; the main difference between SAT scores for eighth grade residential schools were not significant.

Thus, it can be seen that, in general, students with high reading comprehension belong to the group of fast readers and those with low reading comprehension to that of slow readers.

Intercorrelations of Comprehension, Reading Rate, and Chronological Age.

In order to determine whether the results of the tests given in this Study with blind children follow the intercorrelational patterns established for similar tests with seeing children, coefficients of correlation (Pearson r) were computed. These are presented in Table 12 for fourth grade and for eighth grade students in local and residential schools.

Table 12

Intercorrelations (Pearson rs) between Reading Rate (RR), STEP Grade Placement (STEP), SAT Grade Placement (SAT), and Chronological Age (CA).

	RR	STEP	SAT
4th Grade (LS)			
STEP	.35		
SAT	.43	.86	
CA	-.02	-.32	-.32
4th Grade (RS)			
STEP	.07		
SAT	.02	.70	
CA	.32	-.31	-.19
8th Grade (LS)			
STEP	.48		
SAT	.54	.81	
CA	-.35	-.45	-.39
8th Grade (RS)			
STEP	.37		
SAT	.39	.83	
CA	-.26	-.43	-.48

The first column shows the correlations between reading rate and STEP scores, SAT scores, and chronological age. Correlations between reading rate and the two comprehension tests ranged from .02 to .54. Smith and Dechant (35, p.223) state: "Correlations between the rate score and the comprehension score generally range from slight negative to high positive." Harris (12, p.504) in discussing the relationship between rate and comprehension, states: "Most of the correlations are positive but low, averaging around .30." The average correlation between reading comprehension and reading rate in our tests is .33. Thus, the rate-comprehension correlations of this Study in braille reading agree with those found in studies of reading for seeing children.

The correlations between STEP scores and SAT scores (shown as the first items in the second column) are .86, .70, .81, and .83. These high correlations prove that both tests, if used with blind children, are reliable in measuring the same function, comprehension.

The third line in each of the four parts of the table gives the correlations between chronological age and reading rate, STEP scores, and SAT scores. All correlations between chronological age and STEP and SAT are negative, ranging from -.19 to -.48. Blommers and Lindquist (3, p.362) give the following as an example for negative correlations: "For the children in the seventh grade of almost any elementary school, for example, chronological age and scholastic ability are likely to be correlated inversely, that is, the over-age children in the grade are usually among the dullest, while the youngest children are usually among the brightest." Since comprehension is a part of scholastic ability, we must expect inverse (negative) correlations between comprehension scores and chronological age. In this Study, with one exception (fourth grade residential school CA and RR given as .32), reading rate also correlated negatively with chronological age, most likely for the same reasons as mentioned by Blommers and Lindquist.

In conclusion, it can be said that the correlations determined in this Study of the reading of blind children agreed with correlations found in studies of the reading of seeing children. This lends support to the often-voiced assumption that touch reading is similar to visual reading.

Means of Reading Rate, STEP and SAT Scores for "High" and "Low" IQ Groups.

In order to determine whether children with high IQ's (110 and above) scored higher in reading rate and comprehension than children with IQ's below 110, *t* tests were performed. Table 13 presents these data for fourth grade (local and residential schools combined) and Table 14 for eighth grades (local and residential schools separately).

Table 13

Reading Rate, STEP and SAT Scores for High IQ (110 and above) and Low IQ (below 110) Fourth Grade Students

	High IQ Group	Low IQ Group	Difference	*t*
4th Grade (LS & RS)				
N	27	73		
Reading Rate				
Means	87.22	74.14	13.08	n/s
SD	35.90	36.03		
STEP				
Means	6.14	4.38	1.76	4.24*
SD	2.03	1.15		
SAT				
Means	5.34	3.71	1.63	5.47*
SD	1.51	1.00		

*p <.01

Table 14

Reading Rate, STEP and SAT Scores for High IQ (110 and above) and Low IQ (below 110) Eighth Grade Students

	High IQ Group	Low IQ Group	Difference	*t*
8th Grade (LS)				
N	32	18		
Reading Rate				
Means	159.42	126.00	33.52	2.97*
SD	43.47	35.71		
STEP				
Means	10.68	7.89	2.79	4.53*
SD	1.92	2.18		
SAT				
Means	10.17	7.16	3.01	4.59*
SD	2.23	2.23		

*p <.01

Table 14 (continued)

Reading, Rate, STEP and SAT Scores for High IQ (110 and above) and Low IQ (below 110) Eighth Grade Students

	High IQ Group	Low IQ Group	Difference	t
8th Grade (RS)				
N	27	23		
Reading Rate				
Means	135.48	94.09	41.39	3.13*
SD	47.29	45.85		
STEP				
Means	9.95	8.37	1.58	2.87*
SD	1.66	2.15		
SAT				
Means	9.80	7.62	2.18	4.46*
SD	1.87	1.71		

*$p < .01$

On the fourth grade level, the scores for the high IQ group exceeded those for the low IQ group. The difference for reading rate is not significant while the differences for STEP and SAT are significant at less than the .01 level. This suggests that the level of intelligence is not a factor, at this grade level, in the rate of reading. The table of intercorrelations also shows that reading rate has a low to moderate correlation with reading comprehension (*r*s of .02 to .43) on the fourth grade level. Therefore, it can be stated that on the fourth grade level, reading rate is not affected by the children's level of intelligence, whereas reading comprehension is positively related to intelligence.

On the eighth grade level (for local school and for residential school students), the high IQ group is superior in reading rate and in the two comprehension scores, with all differences significant at less than the .01 level. Thus, students with an IQ of 110 and above are significantly better in reading rate and comprehension than those with IQ's below 110. Since reading comprehension and verbal intelligence are, in general, highly correlated (see 12, p.458), this result was expected. Blind children show the same tendencies in this respect as seeing children. This supports the appropriateness of the use of these tests with blind children.

IQ, Reading Rate and Comprehension of RLF and Non-RLF Students.

The data collected made it possible to compare the distribution of IQ's for children whose blindness was caused by retrolental fibroplasia (RLF) with those whose blindness had other causes (non-RLF). Table 15 gives the IQ distribution for fourth grades and eighth grades (local and residential schools combined).

Table 15

IQ Distribution of RLF and Non-RLF Students in Fourth and Eighth Grades

	RLF		Non-RLF	
	N	%	N	%
4th Grade (LS & RS)				
110 and up	9	16.7	18	39.1
90 - 109	28	51.9	20	43.5
70 - 89	17	31.5	8	17.4
Total	54		46	
8th Grade (LS & RS)				
110 and up	48	68.6	12	40.0
90 - 109	20	28.5	15	50.0
70 - 89	2	2.9	3	10.0
Total	70		30	

On the fourth grade level, IQ's of RLF children are more heavily concentrated in the lower IQ range while those of non-RLF children are more heavily concentrated in the upper IQ range. On the eighth grade level, this pattern is reversed. Almost 70% of the RLF students are in the upper IQ range and only about 3% in the lower. Non-RLF students have only 40% in the upper IQ range and 10% in the lower. One can speculate about reasons for this reversal by considering for instance, that the year of birth for eighth grade students in this Study was about 1951, and for fourth grade students about 1955. In 1951, oxygen therapy for prematurely born infants was not yet established as the cause of retrolental fibroplasia. In the birth years of the fourth graders (1955), oxygen therapy was definitely recognized as the factor which caused retrolental fibroplasia by creating a proliferation of vessels and tissues in the retina and the vitreous which caused degeneration or detachment of the retina. Therefore, it was only from 1954 on that oxygen was applied rarely and in a controlled way. It is tempting to speculate whether this change in oxygen administration may have any connection with the IQ differences found in this Study.

In evaluating the data for the eighth grade, it should be recognized that the total number of non-RLF's was only thirty. A distribution based on such a small number of children must be approached with caution.

It has already been shown that on the fourth grade level non-RLF children tend to have higher percentages in the upper and smaller percentages in the lower IQ ranges than RLF children. In order to confirm whether there exists a significant difference between RLF and non-RLF children on the fourth grade level in reading rate and comprehension scores (the latter being highly correlated with intelligence), statistical tests of significance were performed. Table 16 presents the reading rate, STEP and SAT scores for retrolental fibroplasia and non-retrolental fibroplasia students on the fourth grade level (local and residential schools combined).

Table 16

Reading Rate, STEP and SAT Scores for RLF and Non-RLF Fourth Grade Students (Local and Residential Schools Combined)

	RLF	Non-RLF	*t*
N			
Reading Rate	54	46	
Means	82.13	72.43	n/s
SD	39.62	31.57	
STEP			
Means	4.48	5.29	2.70*
SD	1.35	1.82	
SAT			
Means	3.82	4.54	2.77*
SD	1.08	2.77	

*p <.01

There is no significant difference between fourth grade RLF and non-RLF children in their mean reading rate scores. However, on the two comprehension tests (STEP and SAT) the non-RLF children had higher mean scores than the RLF children. The differences for both tests were significant at less than the .01 level. This conforms with the facts noted in the IQ distribution of RLF and non-RLF students. It can, therefore, be stated that on the fourth grade level, non-RLF students have significantly better comprehension than RLF students. Since the differences in reading rate are not significant on the fourth grade level, non-RLF students are more efficient readers than RLF students.

The scores for reading rate and comprehension of eighth grade students could not be combined because of the significant difference in chronological age and IQ between those attending local schools and those attending residential schools. The number of non-RLF children in local and residential schools were too small to permit statistical treatment. However, the IQ distribution for eighth grade students given in Table 15 indicates a clear trend in favor of the RLF group.

Reading Behavior of the Students and Comprehension Scores and Reading Rates

The "Summary of the Statistics Describing Reading Behavior of the Students" presented the statistical details for Items 11 to 23 of the Student Description (Appendix G). The following discussion will deal with the relationship of the students' reading behavior and their comprehension and reading rate scores. To determine whether the reading behavior of students with high reading comprehension scores and with high reading rates differs from that of the students with low reading comprehension scores and low reading rates, the differences in these scores were computed for each of the reading behavior characteristics and tested for significance, whenever the numbers made such statistical treatment possible.

Some of the comparisons yielded no significant differences while for others the numbers were too small to permit statistical tests. Therefore, it was decided to present for such items the actual distribution of the observed behavior for the upper and lower quartiles of the comprehension and of the reading rate scores. This procedure will at least reveal some trends although tests of significance could not be meaningfully computed.

Since STEP scores and SAT scores showed a high correlation, these data were presented only for the STEP scores. Thus, it will be shown how many students who tested in the upper 25 per cent and in the lower 25 per cent of the comprehension and of the reading rate scores used, for instance, the right hand, the left hand, either hand or both hands in reading.

Item 11: Hand use.

No significant differences in STEP, SAT and reading rate scores were found between those using the left or the right hand and those using both hands.

	A Left Hand	B Right Hand	C Either Hand	D Both Hands
Total				
4th Grade	5	19	2	74
8th Grade	12	19	0	69
STEP				
4th Grade				
UQ	0	6	0	19
LQ	2	8	1	14
8th Grade				
UQ	4	5	0	16
LQ	3	6	0	16
Reading Rate				
4th Grade				
UQ	1	2	0	22
LQ	2	5	0	18
8th Grade				
UQ	6	3	0	16
LQ	3	8	0	14

In this presentation and in the following ones, the first two lines give the totals in each of the possible categories for fourth and eighth grades. These totals add up to 100 (50 in local and 50 in residential schools), when all students were involved and the respective question was answered for all of them in the Student Description form (Appendixes G and I). The next lines give the respective numbers of students in each category as they scored in the upper quartile (UQ) and lower quartiles (LQ) of the STEP tests and Reading Rate, for fourth and eighth grades separately.

In reviewing the hand-use of those in the upper quartile of the comprehension scores and reading rates, we find two trends: there are slightly more right-hand readers in the lower quartiles than in the upper quartiles (14 against 11 for STEP and 13 against 5 for RR); and there are slightly more both-hand readers in the upper quartiles than in the lower quartiles (35 against 30 for STEP and 38 against 32 for RR).

Besides a division by reading comprehension and reading rate scores, it also deemed interesting to examine whether students with superior IQ's (above 110) showed differences in hand-use from the other students, and whether there were differences in this respect between fourth and eighth grade students.

Table 17

Numbers and Percentages of Different Hand-use in Braille Reading by Fourth and Eighth Grade Students with IQ's Above and Below 110

		LH		RH		Either		Both	
	N	f	%	f	%	f	%	f	%
4th Grade (LS & RS)									
110 & above	27	0	0	5	19	0	0	22	81
Below 110	73	5	7	14	19	2	2	52	71
8th Grade (LS & RS)									
110 & above	59	8	14	10	17	0	0	41	69
Below 110	41	4	10	9	22	0	0	28	68

Table 17 shows, that of the 27 fourth grade students with superior IQ's, 22 (81 per cent) used both hands and the rest of them used the right hand. Of the 73 fourth graders with IQ's below 110, 52 (71 per cent) used both hands and the rest were right-hand (19 per cent), left-hand (7 per cent), and either-hand (2 per cent) users. Of the 59 eighth grade students with superior IQ's, 41 (69 per cent) used both hands, 10 (17 per cent) used the right hand, and 8 (14 per cent) used the left hand. Of the 41 eighth graders with IQ's below 110, 28 (68 per cent) used both hands, 9 (22 per cent) used the right hand, and 4 (10 per cent) used the left hand.

Two trends are apparent in this distribution: (1) Fourth grade students with IQ's of 110 and above were only both-hand and right-hand users, while those with IQ's below 110 distributed themselves over all four hand-use categories; (2) among the eighth grade students with IQ's of 110 and above, there were percentagewise fewer both-hand users, as compared with fourth graders, and besides right-hand users were also a number of left-hand users. Thus, on the fourth grade level, students with superior IQ's showed a greater uniformity of hand-use (mainly both- and some right-hand users), while those on the eighth grade level showed a greater variety since the preponderance of both-hand users decreased and right- as well as left-hand users were found. As already noted, the use of the right hand for note-taking and the greater independence from teacher standards are factors explaining the increase in the use of left hands for reading by eighth grade students. To these observations may be added that particularly students with superior intelligence may show a stronger expression of their individual preferences as they grow older, regardless of any teacher standards.

Conclusion: No statistically significant differences were found which would support that a specific hand-use is a characteristic of efficiency in braille reading. A trend suggests that both-hand readers may have a slightly better chance to be efficient braille readers than those who use one hand only. Numerically, both-hand readers have almost a three-fourths majority in fourth and eighth grades.

Students with superior intelligence on the fourth grade level are mainly both-hand users with some who use the right hand. On the eighth grade level, this group shows comparatively fewer both-hand users, and right-hand as well as left-hand users.

Item 12: Ways in which both-hand readers use their hands.

Though the numbers for each of the four alternatives (alternative D had no replies) were small, variance analyses were done of the answers A, C, and E. All F ratios were not significant. The variance analyses were done for reading rate, STEP grade placement, and SAT grade placement; for fourth graders combined and for eighth graders in local and residential schools separately.

	A	B	C	E
	r/h reads, l/h finds next line	l/h reads, r/h finds next line	r/h reads, l/h reads ahead in next line	both hands read parallel
Total				
4th Grade	39	2	8	25
8th Grade	30	5	22	12
STEP				
4th Grade				
UQ	10	0	2	6
LQ	8	2	4	3
8th Grade				
UQ	9	0	7	1
LQ	10	3	1	9
Reading Rate				
4th Grade				
UQ	14	0	3	6
LQ	7	1	2	8
8th Grade				
UQ	7	0	7	1
LQ	7	1	4	1

The comparison between numbers of students in the upper and lower quartiles shows two distinct trends. (1) None of the readers who read with the left hand and use the right hand to find the next line (column B) are in the upper quartiles. (2) On the eighth grade level of reading comprehension, those who read ahead with the left hand before finishing the preceding line with the right hand (column C) have seven in the upper quartile and only one in the lower quartile; those who read with both hands "parallel" (column E) have only one in the upper quartile and nine in the lower quartile. This trend on the eighth grade level, favoring those who read ahead with the left hand before finishing the preceding line with the right hand is also, but less distinctly, noticeable for reading rate. It should also be noted that on the fourth grade level, those who use the left hand to find the next line (column A) have, in reading rate, fourteen in the upper quartile and only seven in the lower quartile. On the eighth grade level, they are evenly divided. This could be interpreted as a factor encouraging the use of the right hand with the left hand finding the next line, to produce faster readers on the lower grade level.

Conclusion: No significant differences were found so far as a specific hand-use of both-hand readers is concerned. It is strongly suggested that left-hand readers who use the right hand to find the next line are inferior readers. Eighth graders who read ahead with the left hand while the right hand finishes the preceding line tend to be more efficient readers than the others. There is some indication that fourth graders who read with the right hand and find the next line with the left hand tend to be faster readers.

Item 13: Finger-use of one-hand readers.

Due to the small number of subjects, no tests of significance were performed. The upper and lower quartile distributions did not reveal and consistent pattern either.

Conclusion. No differences in finger-use by one-hand readers revealed any superiority in reading comprehension or reading rate.

Item 14: Finger-use by both-hand readers.

Due to the small number of subjects, no tests of significance were performed.

	1	1,2	1,2,3	1,2, 3,4	1--one hand; 1, 2,3,4 other	Other
Total						
4th Grade	48	16	3	1	6	0
8th Grade	48	10	5	2	1	3
STEP						
4th Grade						
UQ	12	3	2	1	2	0
LQ	13	2	1	0	0	0
8th Grade						
UQ	9	3	3	0	0	1
LQ	12	2	1	1	0	2
Reading Rate						
4th Grade						
UQ	10	4	5	1	2	0
LQ	14	3	0	0	0	0
8th Grade						
UQ	9	5	2	0	0	0
LQ	12	1	0	0	1	1

A review of the upper versus the lower quartiles of both grades shows that those who use only the index (1) fingers of both hands, have a smaller number in the upper quartile and a larger number in the lower quartile (21 against 25 for STEP and 19 against 26 for reading rate). Those who use more than one finger of both hands show the opposite: A majority in the upper quartiles and a minority in the lower quartiles (15 against 9 for STEP and 19 against 6 for reading rate).

Conclusion. The distribution in the upper and lower quartiles suggests that those who use more than the index fingers tend to be superior in comprehension and even more clearly so in reading rate.

Item 15: Book position.

Due to the small number of subjects, no tests of significance were performed.

	Parallel	Slanted to left	Slanted to right	On lap	Other
Total					
4th Grade	78	15	6	1	0
8th Grade	68	16	11	2	1
STEP					
4th Grade					
UQ	20	3	1	1	0
LQ	20	4	1	0	0
8th Grade					
UQ	17	5	2	0	0
LQ	14	7	3	0	1
Reading Rate					
4th Grade					
UQ	21	2	2	0	0
LQ	19	5	1	0	0
8th Grade					
UQ	20	0	3	0	0
LQ	12	7	3	0	1

For fourth graders, we find that practically no differences exist between the distribution in upper and lower quartiles so far as comprehension and reading rate is concerned, neither for those who hold their books in parallel position nor for those who hold it in other positions. On the eighth grade level, however, there are more students who hold their books in parallel positions in the upper quartile than in the lower quartile (17 against 14 in comprehension and 20 against 12 in reading rate). Those who hold their books in other than parallel position tend to be more represented in the lower than in the upper quartiles (11 against 7 in comprehension and 11 against 3 in reading rate).

Conclusion. For fourth graders, the position in which they hold their books does not appear to make any difference. Eighth graders who hold their books in parallel position appear to be better readers in comprehension and even more so in reading rate, than those who hold their books in other positions.

Item 16: Flow of reading.

The statistical analyses suggest an advantage in reading rate, STEP grade placement and SAT grade placement for those students who read in an even flow as compared to those who either stopped and reread words frequently or made frequent return sweeps over the line or a larger part of it. This advantage was significant at less than the .01 level for all differences except for eighth graders in residential schools where only the difference for SAT grade placement reached the .01 level of significance.

Conclusion. Braille readers who read over the lines in an even flow are superior braille readers in comprehension as well as in reading rate.

Item 17: "Rubbing" letters.

The statistical analysis was made for fourth graders only because the number of students who "rubbed" letters among the eighth graders was too small for analysis. For fourth graders there is a considerable advantage in reading rate and in STEP and SAT comprehension for those students who "rub" letters "hardly ever," as compared with those who do this "often" or "occasionally." This advantage was significant at less than the .01 level.

	Often	Occasionally	Hardly ever
Total			
4th Grade	12	28	60
8th Grade	1	15	84
STEP			
4th Grade			
UQ	0	6	19
LQ	5	8	12
8th Grade			
UQ	0	1	24
LQ	1	7	16
Reading Rate			
4th Grade			
UQ	1	3	20
LQ	6	11	8
8th Grade			
UQ	0	2	21
LQ	1	7	16

The distribution of students in the upper and lower quartiles shows the same pattern for fourth graders (for whom a test of statistical significance was made) as for eighth graders. Those who rub letters "hardly ever" are much more frequently found in the upper than in the lower quartile (24 against 16 for STEP and 21 against 16 for reading rate) while the opposite is true for those who lose their places "occasionally" or "often" (8 against 1 for STEP and 8 against 2 for reading rate).

Conclusion. Braille readers who "rub" their letters "hardly ever" are superior in reading efficiency to those who do so "occasionally" or "often."

Item 18: Losing place in reading.

A statistical analysis was made for fourth graders only because the number of eighth grade students who lose their places in reading was too small for analysis. For fourth graders, there is a considerable advantage in comprehension and rate for those students who lose their places "hardly ever" as compared with those who do this "often" or "occasionally." This advantage reached the .01 level of significance for STEP and SAT grade placement but was not significant for reading rate.

	Often	Occasionally	Hardly ever
Total			
4th Grade	7	30	62
8th Grade	2	8	88
STEP			
4th Grade			
UQ	0	3	21
LQ	3	12	10
8th Grade			
UQ	0	1	23
LQ	2	4	18
Reading Rate			
4th Grade			
UQ	1	6	17
LQ	2	10	13
8th Grade			
UQ	0	1	21
LQ	1	2	21

The distribution for eighth graders shows that more students who in reading lose their places "hardly ever," are in the upper than in the lower quartile (23 against 18), but that in reading rate they are evenly divided (21 and 21). However, of those few who lose their places "often" or "occasionally," more are in the lower quartiles.

Conclusion: Students who lose their places "hardly ever" in reading, are more efficient braille readers.

Item 19: Silent speech movement.

STEP scores, SAT scores and reading rate were superior in all groups for those who "hardly ever" accompanied their reading with silent speech. The differences were not significant for fourth graders nor for eighth graders in residential schools. The differences were significant for eighth graders in local schools at less than the .05 level for reading rate and at less than the .01 level for SAT grade placement.

	Often	Occasionally	Hardly ever
Total			
4th Grade	20	22	58
8th Grade	11	13	75
STEP			
4th Grade			
UQ	3	5	17
LQ	5	6	14
8th Grade			
UQ	2	2	20
LQ	5	2	18
Reading Rate			
4th Grade			
UQ	3	5	16
LQ	8	5	12
8th Grade			
UQ	1	2	19
LQ	5	1	18

So far as STEP scores are concerned, a majority of students who show silent speech movements "hardly ever," is found in the upper quartiles, both for fourth and eighth grades. No trend is shown for those who do this "occasionally"; however, more students are found in the lower quartiles who do it "often." So far as reading rate is concerned, slightly more are found in the upper quartiles who do it "hardly ever," no trend is indicated for those who do it "occasionally," but again a majority of students who do it "often" is in the lower quartiles for fourth and eighth graders.

Conclusion. The data show a marked tendency in favor of those who "hardly ever" accompany their reading with silent speech movement as compared with those who do it "often."

Item 20: Mannerisms while reading.

The statistical analyses were made by combining students with mannerisms and comparing them with those who show no mannerisms. In practically all groups (fourth and eighth graders in local and residential schools), students who have no mannerisms show better STEP, SAT scores, and reading rates than the others. The differences were significant for fourth graders at less than the .05 level for STEP and SAT scores but were not significant for eighth graders.

	Rocking	Head Movements	Eye Poking	Others	None
Total					
4th Grade	14	7	12	6	61
8th Grade	7	9	6	5	73
STEP					
4th Grade					
UQ	0	3	2	2	18
LQ	8	2	3	1	11
8th Grade					
UQ	1	2	1	0	21
LQ	3	3	1	2	15
Reading Rate					
4th Grade					
UQ	3	1	4	1	15
LQ	4	0	2	3	16
8th Grade					
UQ	2	2	0	2	18
LQ	1	3	1	2	15

A majority of students who have no mannerisms in reading was found in the upper quartiles of the STEP scores. This was also the case for reading rate on the eighth grade level but not on the fourth grade level. On the other hand, students who showed various kinds of mannerisms had a majority in the lower quartiles of the STEP scores (14 against 7 on the fourth grade level and 9 against 4 on the eighth grade level). So far as reading rate is concerned, those who showed mannerisms were found in the upper as well as in the lower quartiles in almost equal numbers.

Conclusion. There is evidence that students who have no mannerisms tend to be superior in comprehension while those who have mannerisms tend to be inferior. Reading rate appears to be less affected by the presence or absence of mannerisms than reading comprehension.

Item 21: Tenseness while reading.

Due to the small number of students who were tense while reading, no tests of significance were performed.

	Relaxed	Tense
Total		
4th Grade	85	15
8th Grade	84	15
STEP		
4th Grade		
UQ	24	1
LQ	21	4
8th Grade		
UQ	22	3
LQ	17	8
Reading Rate		
4th Grade		
UQ	21	4
LQ	20	5
8th Grade		
UQ	20	4
LQ	21	3

A majority of students who were relaxed when reading was found in the upper quartiles of STEP scores while those who were tense had a majority in the lower quartiles. So far as reading rate is concerned, those who were relaxed or were tense are found in almost equal numbers in the upper and lower quartiles.

Conclusion: Braille readers who are relaxed when reading tend to be superior in reading comprehension. No differences were found so far as reading rate was concerned.

Item 22: Posture while reading.

Statistical analyses were made comparing those whose posture is erect while reading with those whose posture is bent or excessively bent. The statistical tests indicated that there was no advantage for any kind of posture in reading. The distribution of upper and lower quartiles also did not show any clearcut differences.

Conclusion: Posture does not appear to have any influence on reading comprehension or reading rate. (This, of course, does not indicate anything about the importance of posture for health reasons or for appearance.)

Item 23: Frequency of reading outside the classroom.

Students who read "avidly" showed superior achievement in STEP, SAT scores and reading rates, as compared with those who read only occasionally or rarely. The differences were at the .01 level of significance for fourth graders and for eighth graders in local schools. For eighth graders in residential schools, only the difference in STEP scores were significant at less than the .05 level.

The distribution in upper and lower quartiles showed that those who are "avid" readers have a large majority in the upper quartiles of STEP scores and reading rate, while those who read only occasionally or rarely have large majorities in the lower quartiles of STEP scores and reading rate.

Conclusion. "Avid" braille readers are superior readers in comprehension as well as in reading rate, as compared with those who read only occasionally or rarely.

Conclusions

The data collected in connection with the testing part of the Study indicate that blind fourth graders in local schools were 0.8 years and in residential schools 1.2 years over-age; on the eighth grade level, the differences between blind and seeing students were only very small. Far greater age-grade retardations were reported in past studies.

No significant age difference between fourth grade blind children in local and residential schools was found. Eighth graders in residential schools were significantly older by 5.1 months than those in local schools.

For the group of fourth grade students in the Study, IQ's were very close to the average; for the eighth grade students, IQ's were considerably above the normal. There were no significant IQ differences between fourth grade students in local and residential schools, but the differences for eighth graders, though small and therefore not very meaningful, were significant.

Reading comprehension of blind children was at least equal to that of seeing children on the fourth grade level and superior on the eighth grade level. Differences between local and residential schools were not significantly in favor of local school students.

Reading rate means were on the fourth grade level 84 words per minute in local schools, and 72 in residential schools (the difference being statistically not significant); on the eighth grade level, 149 words in local schools and 116 in residential schools (the difference being significant). As a result of their faster reading rate, eighth graders in local schools were more efficient readers than those in residential schools. Reading rates in this Study were considerably faster than those reported in past studies. This suggests a revision of the time allowance for blind students in tests which require reading, from the present 2½ to 3 times the time allowed seeing students to only twice that time.

Intercorrelations between reading rate, reading comprehension, and chronological age conformed closely with those found in studies of the reading of seeing children.

These results show:

1. Age-grade differences between blind and seeing children as groups are far less than reported in the past. Fourth grade blind children are maximally 1.2 years over-age, and practically no difference was found for eighth graders.
2. There was no significant age difference between fourth grade blind children in local and residential schools, but residential eighth graders were about half a school year older than their peers in local schools.
3. The intelligence of blind children on the fourth grade level is normal and on the eighth grade level superior to that of their seeing peers. Possible reasons for the latter were discussed.
4. The intelligence level of blind children in local and in residential schools is practically equal, though a small but significant difference exists in favor of eighth graders in local schools.
5. Reading efficiency of blind students in local and residential schools is equal except for eighth graders in local schools who are superior to those in residential schools.
6. The following revision of time allowance for blind as compared with seeing students, particularly in tests which require reading, is suggested: from the former 2½ to 3 times to only twice the time allowed for seeing students.

On the fourth grade level, retrolental fibroplasia fibroplasia students tended to be more heavily represented in the lower IQ ranges and to be less efficient readers than non-retrolental fibroplasia students. On the eighth grade level, this was reversed so far as intelligence is concerned.

The analysis of reading behavior showed:

1. Since there was no statistically significant

difference in comprehension and reading rate scores between students using the left hand, the right hand, and both hands, ready allowance should be made for individual hand-use preference. A trend and results of past studies suggest that both-hand readers tend to be better readers.

2. Both-hand readers on the fourth grade level should be encouraged to find the next line with the left hand and, as they later become ready for it, to read ahead with the left hand while the right hand finishes the preceding line. Eighth grade readers who did the latter tended to be more efficient readers.
3. The use of more than the index finger(s) should be encouraged in the teaching of braille reading but individual preferences should be readily allowed.
4. On the eighth grade level, holding books in parallel positions to the bodies should be encouraged.
5. Superior braille readers tended to read in an even flow, not to "rub" letters, not to lose their places in reading, and not to accompany their reading with silent speech movements. Also, students without mannerisms, and those who are relaxed when reading tended to be superior readers. These characteristics should, therefore, be encouraged.
6. Posture in reading appeared to have no influence on reading efficiency.
7. "Avid" braille readers were superior readers, as was to be expected.

Summary

The 200 students in the testing part of the Study were given STEP Reading Tests and SAT Paragraph Meaning Tests on the fourth and eighth grade level. Besides the test results, which also included information about reading rate, data on the chronological age and the IQ's were recorded.

The chronological age of fourth graders showed that blind children in local schools were 0.8 years and in residential schools 1.2 years older than their seeing peers. On the eighth grade level, there were only very small differences between blind and seeing students. There was a somewhat greater age variability among blind fourth grade students in local and residential schools and among blind eighth graders in residential schools, as compared with seeing ones. Also, the age variability in residential schools was greater than that in local schools. These data differ markedly from those presented in previous studies which reported far greater age-grade retardation of blind as compared with seeing students.

The mean intelligence quotients for fourth grade students in local and residential schools were very close to the average IQ of 100 (100.4 in local schools, 98.6 in residential schools). On the eighth grade level, the IQ's of blind students were considerably above the normal (113.6 for local schools, 110.2 for residential schools). This is in line with previous findings by Hayes. The IQ differences between fourth grade students in local and residential schools were statistically not significant but those for eighth graders, though in IQ points not very meaningful, were significant.

Reading comprehension data resulting from the STEP and SAT tests showed that in reading comprehension, blind children are, in general, at least equal to seeing children on the fourth grade level and are superior on the eighth grade level. The differences in reading comprehension between local and residential schools, though the means were in all cases higher for local schools, were statistically not significant.

"Reading efficiency" has two components: comprehension and rate. Reading rates were determined in connection with the administration of the STEP Reading Tests. The mean reading rate (words per minute) was on the fourth grade level 84 in local schools and 72 in residential schools (the difference being statistically not significant); and on the eighth grade level, 149 in local schools and 116 in residential schools (the difference being significant).

On the fourth grade level, blind children in local and those in residential schools were equal in braille reading efficiency, since neither in reading comprehension nor in reading rate significant differences were demonstrated.

On the eighth grade level, no significant difference in reading comprehension was shown between local and residential schools, but the significant difference in reading rate indicates that eighth grade students in local schools were more efficient readers than their peers in residential schools.

Reading rates in this Study showed a considerable increase as compared with those in previous studies of reading rates of blind children. If reading rates of blind children are compared with those given for seeing children on the same grade levels, fourth grade seeing students read about twice as fast as blind students and eighth grade seeing students read about 1½ times as fast as blind students in local schools and about twice as fast as blind students in residential schools. Since in the past 2½ to 3 times reading time was allowed for blind children as compared with that for seeing children, the results of this Study suggest that the reading time allowance for blind children be reduced to 2 times the time allowed for seeing students. This would avoid giving blind children a "built-in" advantage over seeing children in testing situations which require reading.

The data also revealed that, in general, students with high reading comprehension belong to the group of fast readers and those with low reading comprehension to that of slow readers.

Intercorrelations between STEP and SAT reading comprehension scores were high and those between reading comprehension and reading rate were positive but generally low. Intercorrelations between reading rate and comprehension on the one side and chronological age on the other were generally negative. All intercorrelations determined in this Study agreed with those found in studies of the reading of seeing children.

The data of the Study also showed that comprehension scores and reading rates for high IQ students (110 and above) were significantly superior to those of students with IQ's below 110. The same tendencies in this respect have been reported for seeing students.

IQ, reading rate, and reading comprehension data were also compared for children whose blindness was caused by retrolental fibroplasia (RLF) with those whose blindness had other causes (non-RLF). The IQ distribution showed that non-RLF students on the fourth grade level had considerably higher percentages in the upper IQ ranges and lower percentages in the medium and lower IQ ranges than RLF students. On the eighth grade level, this was reversed and RLF students had higher percentages in the upper IQ ranges and lower percentages in the medium and lower IQ ranges than non-RLF students. This change in IQ distribution occurred for RLF children on the fourth grade level who were born about 1955, and for those on the eighth grade level who were born about 1951. Their respective years of birth coincide with the years in which the change in oxygen therapy for prematurely born infants took place. To determine whether there is any connection between these two factors is beyond the scope of this Study.

It was also found that on the fourth grade level, non-RLF students are more efficient readers than RLF students. The numbers of non-RLF eighth graders were too small to permit statistical analysis.

So far as reading behavior is concerned, the distribution of responses did not always permit statistical testing of the differences. Therefore, the actual distribution of the observed reading behavior characteristics was determined for the upper and lower quartiles of the comprehension and of the reading rate scores. Thus the following results indicate definite statistical differences whenever possible, and trends whenever upper and lower quartiles were compared.

No significant differences were found in comprehension and reading rate scores between those students using the left or the right hand and those using both hands. A trend suggests that both-hand readers who have an almost three-fourths majority in fourth and eighth grades, have a slightly better chance to be efficient braille readers than those who use one hand only. Also, students with superior intelligence on the fourth grade level are mainly both-hand users, with some who use only the right hand. Students with superior intelligence on the eighth grade level show comparatively fewer both-hand users and right- as well as left-hand users.

Since other studies (5, 10, 27) found both-hand readers better readers, it is suggested that teachers encourage the use of both hands in the teaching of braille reading, but readily make individual allowances for any child who indicates a preference for a different hand-use.

If a fourth grade student reads with both hands, he should be encouraged to find the next line with the left hand since these students tended to be faster readers. Eighth graders who read ahead with the left hand while the right hand finishes the preceding line tended to be more efficient readers than the others. Therefore, this kind of hand-use should be encouraged at the individually proper time for both-hand readers.

Although no statistically significant findings were revealed concerning the finger-use of one-hand readers, the distribution in the upper and lower quartiles of the finger-use of both-hand readers suggests that those who use more than the index fingers tend to be superior in comprehension and even more clearly so in reading rate. Therefore, it is suggested that the use of more than the index fingers be encouraged in the teaching of braille reading, but individual preferences should be readily allowed.

The position in which fourth graders hold their books did not appear to make any difference. On the eighth grade level, more efficient braille readers tended to hold their books in parallel position to their bodies.

Braille readers who read in an even flow, who rarely "rub" letters, who rarely lose their places in reading, and who rarely accompany their reading with silent speech movements tended to be superior readers. Therefore, in the teaching of braille reading, these four reading behavior characteristics should be encouraged.

Students who have no mannerisms while reading tended to be superior, with reading rate less affected than reading comprehension by the presence or absence of mannerisms. Braille readers who are relaxed when reading tended to be superior in reading comprehension, with no difference in reading rate. Posture did not appear to have any influence on reading comprehension or reading rate. Therefore, it is recommended that mannerisms while reading be discouraged and relaxed reading encouraged. Good posture, though of no influence on reading comprehension and reading rate, should be encouraged for other reasons such as health and appearance.

Braille readers who read "avidly" were superior readers in comprehension as well as reading rate. It seems superfluous to add that "avid" reading be encouraged.

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SAN FRANCISCO STATE COLLEGE
1600 Holloway Avenue
San Francisco, California 94132

BERTHOLD LOWENFELD, Ph.D.
Principal Investigator
Braille Reading Study
2928 Avalon Avenue
Berkeley, California 94705

Dear Friend:

You are perhaps aware that San Francisco State College has been awarded a grant which makes possible research in the methods of teaching Braille Reading. This grant came through the Cooperative Research Branch of the Office of Education, Department of Health, Education, and Welfare, Washington, D. C. We feel sure that you will want to cooperate with us in this important effort of a scope not possible since the work of Kathryn E. Maxfield, "The Blind Child and His Reading," published in 1928.

We at San Francisco State College feel fortunate that we have as our Principal Investigator, Dr. Berthold Lowenfeld who is known to all of you professionally, and to many of you personally.

We have planned in our research design to send out questionnaires which should be filled out by different people in the schools providing educational programs for blind children. We are anxious to select our schools to some extent on the basis of the first questionnaire, and we trust that we may have your cooperation in seeing that this questionnaire is routed to the appropriate person having the experience necessary to provide the requested information. We made every effort to keep the questionnaire brief, yet of sufficient scope to furnish the information needed.

You will note by examining the questionnaire that we would like to have all replies returned by January 10, 1965. We trust that this gives you ample time to provide us with this important basic information.

Thank you for your highly valued cooperation,

Sincerely yours,

Georgie Lee Abel

Georgie Lee Abel
Project Director

GLA:fw
6-1-65

SAN FRANCISCO STATE COLLEGE
1600 Holloway Avenue
San Francisco, California 94132

BRAILLE READING STUDY
UNDER A GRANT OF
The Cooperative Research Branch
Office of Education
U.S. Department of Health,
Education, and Welfare
Washington, D.C.

Georgie Lee Abel, B.S., M.A.
Project Director

Berthold Lowenfeld, Ph.D.
Principal Investigator
2928 Avalon Avenue
Berkeley, California 94705

February 25, 1965

Dear Friend:

Some time ago Miss Georgie Lee Abel, Project Director of the Braille Reading Study, sent a letter to your school of which we are enclosing a copy. In reply to this letter, questionnaires have been returned to us at a most gratifying rate. At present, 72% of our requests were answered and most of the teachers who responded indicated their continued interest in the study.

In reviewing the replies, we find that we have not received an answer from your school. We put great value on having as large a percentage of schools as possible represented in our study. For this reason, we urgently request that you cooperate with us in making our study highly representative. Would you be good enough to ask the primary teachers of visually handicapped children in your school to send us their reply by return mail. The questionnaire, of which a copy is enclosed, can easily be answered in less than ten minutes, and we hope your teachers will be willing to do this in the interest of braille reading research.

If you should have sent your reply already, please disregard this letter, except for accepting our warmest thanks for your cooperation.

Sincerely yours,

Berthold Lowenfeld.

Berthold Lowenfeld
Principal Investigator

BL:fw
Enclosures

School:

Answered by:

Position held:

BRAILLE READING STUDY
QUESTIONNAIRE A

This questionnaire should be filled out by the person, or persons, best suited to answer questions dealing with the teaching of braille reading to school beginners.

The answers should be given on the basis of methods practiced with blind (braille) students who have no marked additional handicaps.

The answers should reflect the actual program in the primary grades of your school, not what might be considered desirable.

1. When is braille reading begun?

   a. Kindergarten _____
   b. 1st grade, first semester_____; second semester_____
   c. 2nd grade_____

2. How do you begin teaching braille reading?

   a. With the braille alphabet_____
   b. With whole words_____
   c. With meaningful sentences_____

3. What grade of braille do you use in beginning reading?

   a. Braille Grade 1 (full spelling)_____
   b. Braille Grade 1½ (slightly contracted braille)_____
   c. Braille Grade 2 (fully contracted braille)_____

4. If you do not begin with Braille Grade 2, when do you introduce it?

   a. 1st grade_____
   b. 2nd grade_____
   c. 3rd grade_____
   d. 4th grade_____

5. With which hand do you encourage children to read?

   a. With the right hand_____
   b. With the left hand_____
   c. With both hands_____

6. Does right - or left-handedness receive consideration in your program?

   Yes_____ No_____
   If "yes", please explain briefly.

7. Circle the finger (or fingers) which you encourage children to use in reading:

Left hand	Right hand
4 3 2 1	1 2 3 4

Check here if you leave it to the children to use fingers as they prefer_____

8. Who provides initial instruction in braille reading, and how many are employed at your school in each category listed:

   A. For residential schools:
      a. The classroom teacher_____ Number_____
      b. A special braille instructor_____ Number_____
      c. Other (specify)_______________________________________ Number_____

   B. For public school programs:
      a. The resource teacher_____ Number_____
      b. The itinerant teacher_____ Number_____
      c. The classroom teacher of visually handicapped children_____ Number___
      d. The regular classroom teacher_____ Number_____
      e. A special braille teacher_____ Number_____
      f. Other (specify)_______________________________________ Number_____

9. When do you introduce braille writing?

   a. At the same time as reading_____
   b. After some reading skill has been developed_____
   c. Second grade_____
   d. Third grade_____
   e. According to the child's individual level of ability_____

10. What do you use to teach beginning writing?

   a. Slate and stylus_____
   b. Braillewriter_____

Use this space for comments which will be appreciated:

Please return this Questionnaire by January 10, 1965 to: Dr. Berthold Lowenfeld
2928 Avalon Avenue
Berkeley, California
94705

SAN FRANCISCO STATE COLLEGE
1600 Holloway Avenue
San Francisco, California 94132

BRAILLE READING STUDY
UNDER A GRANT OF
THE COOPERATIVE RESEARCH BRANCH
OFFICE OF EDUCATION
U.S. DEPARTMENT OF HEALTH,
EDUCATION, AND WELFARE
WASHINGTON, D.C.

GEORGIE LEE ABEL, B.S., M.A.
PROJECT DIRECTOR

BERTHOLD LOWENFELD, PH.D.
PRINCIPAL INVESTIGATOR
2928 AVALON AVENUE
BERKELEY, CALIFORNIA 94705

August 30, 1965

Dear Friend:

You and your teachers were good enough to respond to the questionnaire of the Braille Reading Study conducted at San Francisco State College. We appreciate your cooperation, which encourages us to ask for your further assistance. In our undertaking which, we hope, will result in a long-needed publication dealing with braille reading instruction, we are in need of a representative sample of braille readers in the 4th and 8th grades.

According to the plans of the study, two reading tests, the Sequential Tests of Educational Progress (STEP), Reading part only, and the Stanford Achievement Tests, Reading Comprehension only, will be given to 4th and 8th grade blind students enrolled in local and residential schools. We estimate that the administration of these tests will require two hours time for each group.

For the purpose of these tests, only children with a visual acuity of 5/200 or less are to be included in the sample. They should not have any marked additional handicap.

We would appreciate it greatly if you would fill out the enclosed card giving us the number of your students meeting our specifications, enrolled in 4th and 8th grades as of Fall 1965.

We are in a position to pay the teachers for their efforts at the rate of $5.00 per child tested, and know that this can be only a token of our appreciation.

Since we must order the correct number of braille tests as soon as possible, we would be most grateful to you for an early reply. To continue your past example of cooperation, may we hope, if possible, for a reply by September 10?

With best wishes for the new school year,

Sincerely yours,

Berthold Lowenfeld

Berthold Lowenfeld
Principal Investigator

BL:fw
Enclosure

C

SAN FRANCISCO STATE COLLEGE
1600 Holloway Avenue
San Francisco, California 94132

BRAILLE READING STUDY
UNDER A GRANT OF
THE COOPERATIVE RESEARCH BRANCH
OFFICE OF EDUCATION
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GEORGIE LEE ABEL, B.S., M.A.
PROJECT DIRECTOR

BERTHOLD LOWENFELD, PH.D.
PRINCIPAL INVESTIGATOR
2928 AVALON AVENUE
BERKELEY, CALIFORNIA 94705

Enclosed we are sending to you material in connection with the testing for the Braille Reading Study since you were good enough to indicate your willingness to cooperate in it.

You will receive the braille tests for the individual students and the directions for administering the tests from the American Printing House for the Blind. The combined materials will enable you to give the tests.

In accordance with the information you mailed to us on the postcard, we request that you apply the tests and give us the necessary information for the following number of students:

Fourth Grade _______ Eighth Grade ________

(If, for reasons of geographical distribution, these are fewer than you indicated on the postcard, please take them in alphabetical order until the requested number is reached. This will safeguard a random selection.)

The STEP (Sequential Tests of Educational Progress), Reading Test only, has two parts. Please follow exactly the directions given in the American Printing House for the Blind booklet, "Supplemental Directions for Administering Braille Tests," as printed on pages 1 to 4. In addition, we are asking you to check the rate of reading according to the separate Directions for the Rate of Reading Test, enclosed with this material.

The Stanford Achievement Test Battery has many parts, of which we want only the Paragraph Meaning used. It is also divided into two parts. Please follow the Directions for Administering Braille Editions as supplied by the American Printing House for the Blind.

After the tests are given, please transfer the answers of the students from the braille tests to the IBM sheets supplied with the STEP and with the Stanford Achievement Tests. It is most important that you fill in the name of each student in the space provided at the left-hand margin of the IBM sheets. Only these sheets need to be returned to us since they give us all information about the test results.

We are willing to participate in the study. Yes_____

No_____

If yes, the numbers of children with visual acuity of 5/200 or less are:

Number in 4th grade_____
Number in 8th grade_____

Test material should be sent to:

Name:

School:

Address:

In addition to the tests, we have two other items:

(1) A "Student Description" to be recorded on IBM cards. A separate card should be filled out for each student on the basis of your individual observations of his reading and from otherwise available information. The enclosed Instruction Sheet for Student Description will explain what we want to know and how this should be recorded on the IBM cards with the specially prepared pencils that you will find enclosed.

(2) We will appreciate it if you will fill out the enclosed short questionnaire "Reading Instruction Information" which relates to some aspects of the total reading program of your school or class. Only one needs to be filled out for each school or class.

We know that what we are asking you to do in the interest of improving braille reading instruction will take some time. Therefore, we are counting on receiving the replies anytime before December 15. We will be happy to send you the five dollars per student honorarium after receipt of your tests; please give us your name and address for this purpose. We are more than conscious of the fact that this constitutes only a token of our real gratitude for your professional cooperation.

Please use the enclosed checklist before returning the material to us, so that we will receive the needed full information. A stamped and addressed return envelope is included.

Sincerely yours,

Berthold Lowenfeld.

Berthold Lowenfeld
Principal Investigator
Braille Reading Study

BL:fw
Enclosures

San Francisco State College
Braille Reading Study

Instruction Sheet for Student Description

Attached is a Student Description Sheet and IBM cards to be used for describing the characteristics of students participating in this Study. One IBM card is provided for rating each individual. Space is provided along the bottom of the card for the student's name, birthdate, the name of your school and city. Ratings are to be indicated by marking in the "bubbles" with the enclosed electrographic pencil. Please use only this pencil for marking the answers. Do not make any extraneous marks on the cards as they will cause difficulty in processing.

Each item is to be responded to by marking in "bubble" A, B, C, D, E, or F next to the item number. For example, item number two on the Student Description Sheet asks for the student's I.Q. If the I.Q. of the student being rated is between 90 - 99 you should fill in the "bubble" under letter C.

Please respond to all of the items for which you have information, marking only one alternative for each item. If there is some information you cannot provide, leave the "bubbles" for that item blank.

Pencils need not be returned.

San Francisco State College
Braille Reading Study

Student Description

1. Grade level:
   - A. Fourth
   - B. Eighth

2. The student's I.Q. falls within the range of:
   - A. 70 - 79
   - B. 80 - 89
   - C. 90 - 99
   - D. 100 - 109
   - E. 110 - 119
   - F. 120 and over

Respond to either Item 3 or 4

3. Indicate the student's over-all grade level achievement based on the latest achievement test scores:
   - A. 0.4 years below to 0.4 years above grade level
   - B. 0.5 - 0.9 years below grade level
   - C. 1.0 - 1.4 years below grade level
   - D. 1.5 - 1.9 years below grade level
   - E. 2.0 - 3.0 years below grade level
   - F. Over 3.0 years below grade level

or

4.
   - A. 0.5 - 0.9 years above grade level
   - B. 1.0 - 1.4 years above grade level
   - C. 1.5 - 1.9 years above grade level
   - D. 2.0 - 3.0 years above grade level
   - E. Over 3.0 years above grade level

5. The student first was enrolled at your school:
   - A. Kindergarten
   - B. 1st grade
   - C. 2nd grade
   - D. 3rd grade
   - E. 4th to 5th grade
   - F. 6th to 8th grade

6. The student started receiving braille reading instruction in:
   - A. Kindergarten
   - B. 1st grade
   - C. 2nd grade
   - D. 3rd grade
   - E. 4th grade
   - F. 5th grade and above

7. Cause of student's blindness:
   - A. Retrolental Fibroplasia
   - B. Cataracts
   - C. Congenital Glaucoma
   - D. Optic Atrophy
   - E. Retinal defects
   - F. Other

8. The student's vision is (in the better eye or in both eyes with best obtainable correction):
    A. Total blindness
    B. Light perception
    C. Light projection (able to point at source of light)
    D. Form perception
    E. Less than 5/200
    F. 5/200

9. Age at onset of student's blindness:
    A. Birth
    B. First year
    C. 2 - 4 years
    D. 4 - 6 years
    E. 6 - 10 years
    F. After 10 years

10. Check only the primary additional handicaps the student has (if any):
    A. Hearing
    B. Speech
    C. Orthopedic
    D. Emotional
    E. Neurological
    F. Other

11. The student reads with:
    A. The left hand
    B. The right hand
    C. Either hand
    D. Both hands

12. If he uses "both" hands does he:
    A. Use the left hand to find next line
    B. Use the right hand to find next line
    C. Read next line with left hand before finishing preceding line with right hand
    D. Read next line with right hand before finishing preceding line with left hand
    E. Read with both hands moving together in "parallel" motion

13. If the student reads with one hand (left or right), his reading finger(s) is (are):
    A. Index finger (1st finger) only
    B. 2nd finger only
    C. Index and 2nd fingers
    D. Index, 2nd, and 3rd fingers
    E. Index, 2nd, 3rd, and 4th fingers
    F. Other combinations

14. If the student reads with both hands (left and right), his reading fingers are:
    A. Both index fingers
    B. Index and 2nd fingers of both hands
    C Index, 2nd, and 3rd fingers of both hands
    D. Index, 2nd, 3rd, and 4th fingers of both hands
    E. Index finger of one hand, all 4 fingers of other hand
    F. Other combinations

15. The student holds his braille book when reading:
    - A. In approximately parallel position to his body
    - B. Slanted to the right
    - C. Slanted to the left
    - D. On lap, even though reading at desk
    - E. Other

16. The student reads:
    - A. In an even flow
    - B. Stopping and rereading words frequently
    - C. Making frequent return sweeps over the line he reads or larger part of it

17. The student "rubs" letters:
    - A. Often
    - B. Occasionally
    - C. Hardly ever

18. The student loses his place:
    - A. Often
    - B. Occasionally
    - C. Hardly ever

19. The student accompanies his reading with silent speech movements (lips, larynx):
    - A. Often
    - B. Occasionally
    - C. Hardly ever

20. The student's primary mannerism in reading is:
    - A. Rocking
    - B. Head movements
    - C. Eye poking
    - D. Others
    - E. None

21. The student when reading is:
    - A. Relaxed
    - B. Tense

22. The student's posture when reading is:
    - A. Erect
    - B. Bent
    - C. Excessively bent

23. Outside of the classroom the student reads:
    - A. Avidly
    - B. Occasionally
    - C. Rarely
    - D. Not known

San Francisco State College
Braille Reading Study

Directions for the Rate of Reading Test

This should be given only with the first passage of Part One of the STEP Reading Test, for both, fourth and eighth grade students. The test begins with the tester saying, "Ready? Begin!" You may use a stopwatch or your own watch with a second hand and begin the timing when the students have turned to Part One and are starting to read. After exactly one minute ask the students to stop and you mark with a pencil the place where their reading finger came to a standstill.

Please write at the bottom of the STEP IBM sheet the number of the braille line where the student stopped and the last two words read by him (those before the pencil mark you made).

SAN FRANCISCO STATE COLLEGE
BRAILLE READING STUDY

F	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
E	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
D	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
C	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
B	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
A	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27

INSTRUCTIONS: Use the electrographic pencil supplied and make a firm dark line in the appropriate bubble.
Mark only one alternative per item.

NAME OF STUDENT | BIRTHDATE | NAME OF SCHOOL | CITY

L61140

San Francisco State College
Braille Reading Study

READING INSTRUCTION INFORMATION

(To be filled out by one of the teachers who administers the tests—one for each school or class)

1. Name of Reading Series presently used:

2. What supplementary materials, such as workbooks, are used:

3. When are reading books, including pre-primers, introduced?

   a. At the beginning of braille reading instruction__________

   b. After words or sentences are read__________

4. Is your reading instruction primarily conducted by:

   Oral Reading________ Silent Reading________ Both_________

5. Is double-spaced material used in beginning reading instruction?

   Yes_________ No_________

6. Is enlarged cell material used in beginning reading instruction?

   Yes_________ No_________

7. Check which Tests you are using routinely at your school or class:

   Hayes Binet Intelligence Tests_________ Stanford Achievement Tests________

   Wechsler Intelligence Scales__________ Others (Please name):

San Francisco State College
Braille Reading Study

Checklist of Material To Be Returned

Please check the material to be returned to us carefully because everything depends upon the receipt of all items.

(1) The IBM sheets (one for each student) on which the results of the STEP Reading Test are recorded, with the Reading Rate information (last line and last 2 words read) written at the bottom.

(2) The IBM sheets (one for each student) on which the results of the Stanford Achievement Test (Paragraph Meaning only) are recorded.

(3) The IBM cards (one for each student) on which the "Student Description" is recorded.

(4) The completed "Reading Instruction Information."

Do not forget to write the student's name on the items 1, 2, and 3!

No other material need be returned.